

Superfast Broadband Business Exploitation Project

Digital Maturity Survey Report 2016

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Cardiff Business School
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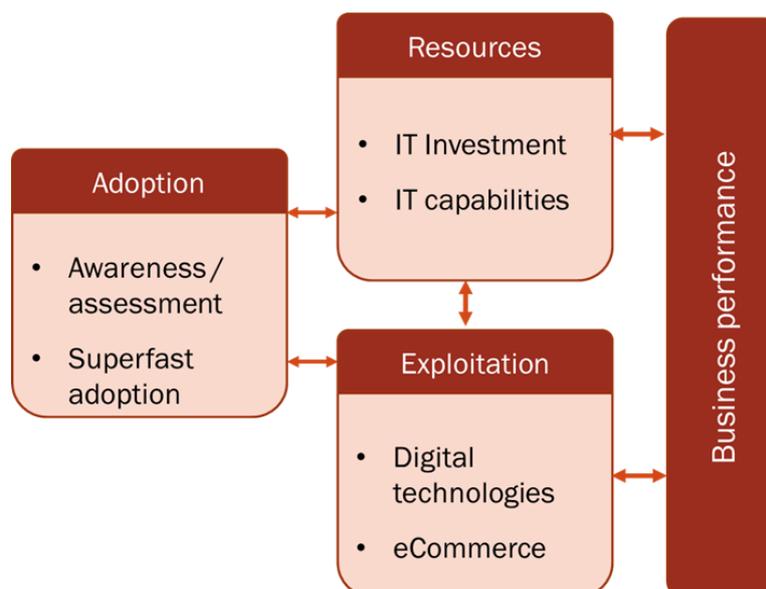
Summary

The Welsh Government and Cardiff Business School were successful in 2015 in gaining European Regional Development Funding (ERDF) for a programme of business support to assist Small and Medium Enterprises (SMEs) across Wales to engage with superfast broadband infrastructure, other e-connectivity and consequently enabled technologies. This programme of support – The Superfast Broadband Business Exploitation (SBBE) programme - went live in January 2016 for a period of five years.

Cardiff Business School is providing a research and intelligence function surrounding the programme of business support. The first substantive output from the research and intelligence function was to provide a report on the methods to be followed in developing a *Digital Dashboard for Wales* and a resulting economic impact assessment showing how SMEs have benefited from services levered by superfast broadband (WERU, 2016).

This report then provides details of WERU's first annual *Digital Maturity Survey* (2016). It sets out the results from a survey of 166 businesses in Wales, including their adoption of superfast broadband, their infrastructure and IT capabilities, and performance. The framework adopted for the annual digital maturity survey is set out in the Figure 0-1 below. This framework has been developed from a review of existing studies on digital maturity, and is intended to reflect the processes by which superfast broadband adoption both shapes, and is shaped by a businesses' resources, the use and exploitation of broadband, and the subsequent performance impact.

Figure 0-1 Digital maturity framework



The main findings of the Digital Maturity Survey 2016 are that:

- Most SMEs that participated in the survey have standard broadband, while only a third have adopted superfast broadband (defined as SMEs being able to achieve download speeds of at least 24Mbps). The majority of standard broadband users, however, are aware of, or interested in superfast broadband. Superfast broadband adoption rates vary significantly by business size, industry sector, geographical area and region. SMEs with superfast broadband are more likely to engage in innovation activity than standard broadband users. Innovation focus, however, is not influenced by broadband type, with both standard and superfast broadband users innovating in new service and products.
- Only 15% of responding businesses had a dedicated IT budget. Although medium sized businesses have the highest average expenditure on broadband subscriptions in absolute terms, micro businesses have a higher average spend per employee on monthly broadband subscriptions. As businesses grow larger, high IT investment does not lead to improvements in performance amongst respondents.
- Most SMEs have access to staff with adequate IT skills and capabilities. Nearly 60% of sampled SMEs employed staff with intermediate and above IT skills, 50% of SMEs have staff with knowledge of using cloud enabled services at business, and nearly two thirds of businesses in the whole sample have access to IT support.
- SMEs with high IT capability – defined by the level of SMEs’ human IT-related resources - are concentrated in the information and communication and business services sectors. Micro and young SMEs, however, are the most digitally advanced businesses; yet their access to superfast broadband was reported to be constrained by its high associated costs.
- SMEs are more confident in using e-commerce than wider digital technologies. Even businesses with high IT capability find it difficult to successfully implement digital technologies in their business. Overall, the more digitally mature businesses in the sample tended to perform better in terms of growth and innovation.

The key findings from the research are further distilled in the *Digital Dashboard 2016* (Figure 0-2 below).

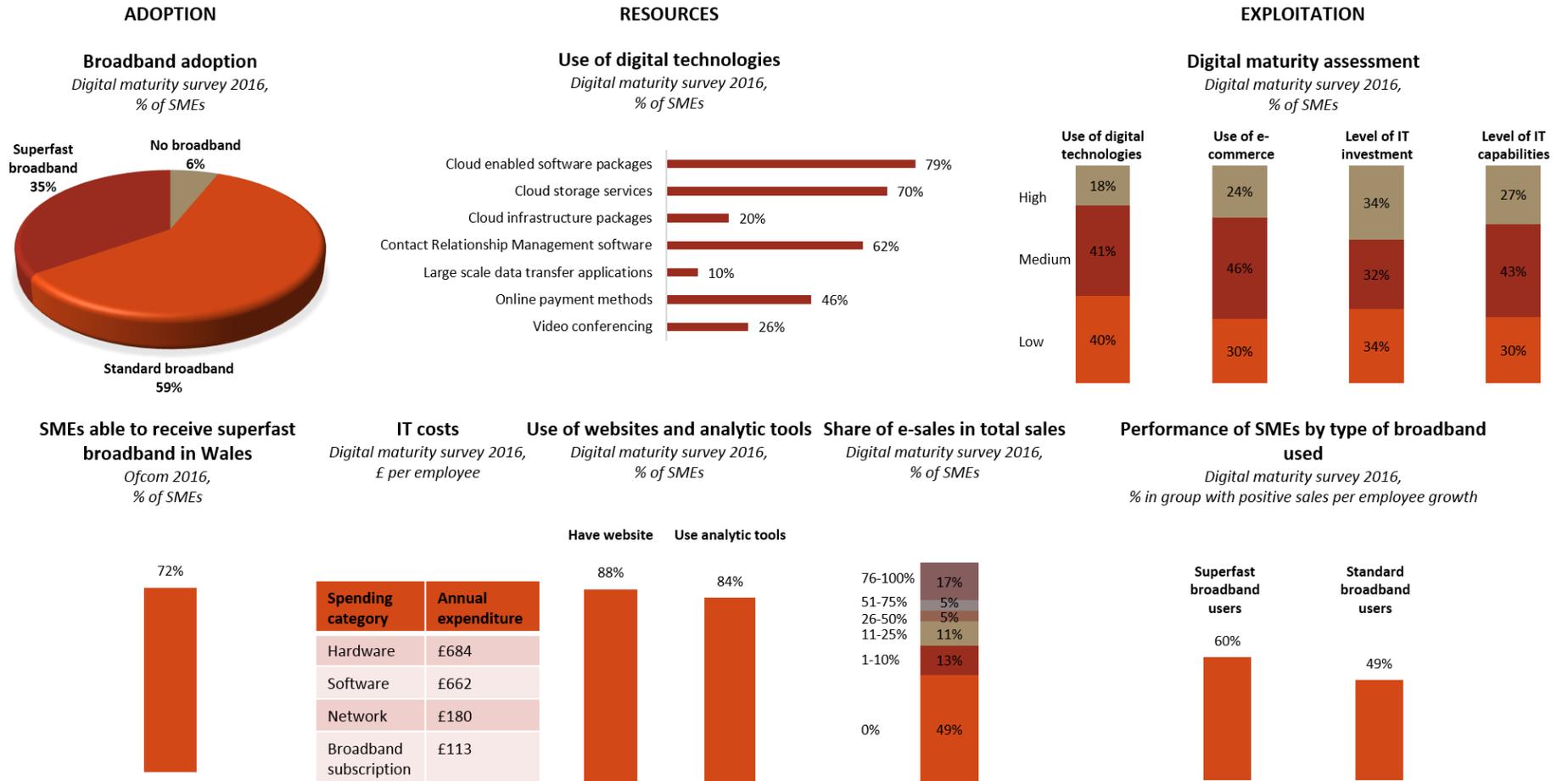
The context for the research and the wider Welsh Government Superfast Broadband Business Exploitation programme is that business productivity in Wales is far lower than that in competing regions of the UK and wider European Union, and with this one explanation of the gross value added per capita gap between Wales and adjacent parts of the UK. Transport and education infrastructure impacts business productivity but so can access to the services offered on superfast broadband platforms. The economic impact analysis that follows from this report will seek to better quantify these types of connections, using the survey findings to help develop estimates of the all-Wales outcomes levered by superfast broadband.

Alongside the development of the current report will be a series of case studies of SMEs. The case studies will be used to assess in more detail SME use of the new technology, and how this translates into innovation in terms of products and processes, and then links to improved business productivity and performance. This more detailed case work, and economic impact analysis is essential in identifying how access to superfast broadband resources can contribute to economy-wide outcomes, and the types of intervention that have the strongest effects on SME performance.

While these types of issues have been described in the current report, more research is needed to drill down into these findings and to develop policy relevant outcomes. Care is needed, however, in using, and then generalising from the findings in the first Digital Maturity Survey. Of particular concern is the low level of responses from some sectors of the regional economy. The research planned during the coming year will seek to address such issues.

This report was written by Dylan Henderson, Calvin Jones, Max Munday, Laura Norris, Annette Roberts, Neil Roche, and Anna Scedrova. Results of the survey and other research activities can be found at <http://www.cardiff.ac.uk/superfast-broadband-project>

Figure 0-2 Digital dashboard 2016



1 Introduction

This report sets out findings from Cardiff Business School's first *Digital Maturity Survey 2016*. It draws on a survey of Small and Medium Enterprises (SMEs) in Wales to identify their adoption and use of digital technologies enabled by superfast broadband. The research is working to inform activity within the Welsh Government Superfast Broadband Business Exploitation (SBBE) project.

1.1 The research

The *Digital Maturity Survey 2016* is the first of a series of annual surveys that will be undertaken during the life of the SBBE project (2016-2020). It provides detailed evidence on the maturity of businesses adoption and use of digital technologies. The objective of the survey is to provide:

- A longitudinal dataset to examine SME progress in exploiting superfast broadband over time
- Robust and measurable data on business' digital maturity in Wales
- Source data for subsequent research on economic impacts
- Case study leads for businesses exploiting superfast broadband in practice
- An evidence-base for policy-makers, to inform business support

A key element of the survey is the annual *Digital Dashboard*. This provides a snapshot for policy makers and practitioners alike to monitor the spread of digital technologies over the lifetime of the SBBE project.

The survey forms part of a wider programme of Superfast Broadband research, undertaken by Cardiff Business School, including economic impact modelling and horizon scanning. Results of the survey and these other activities can be found at <http://www.cardiff.ac.uk/superfast-broadband-project>

1.2 The context for the research

The context for this research is one of limited evidence on the impacts of businesses exploiting superfast broadband. While research has begun to examine the nature and extent of economic impacts, there is no source of time series data available at the level of Wales and its sub-regions. This presents challenges for policy to assess the case for investments in infrastructure and support.

Much of the evidence on take-up of superfast broadband is patchy, with business take-up of superfast broadband strongest in urban areas. In contrast, take-up in more rural parts of Wales has been largely by households rather than businesses. As a consequence, parts of Wales are falling behind the UK average for broadband take-up among businesses (Ofcom, 2016). There is also a need for a higher level of take-up by businesses, but also a challenge for these same businesses to use broadband in more innovative ways.

More generally business broadband exploitation support is set in a context of sub regions of Wales facing persistent socio-economic disadvantage. This is typically defined in terms of relatively low levels of gross value-added per capita. A contributory factor is poor productivity among SMEs and here the innovative take-up of superfast broadband could work to lever productivity gains, and act as a component of economic convergence processes.

Elements of recent Welsh Government programmes have focused on rolling out high quality broadband infrastructure, particularly in more peripheral and rural parts of Wales. Superfast Cymru is scheduled to deliver high speed fibre broadband to 690,000 premises by June 2017 at speeds of at least 30Mbps. There is, however, recognition derived from UK and overseas case evidence that the provision of the hard infrastructure may not in and of itself drive business adoption of superfast broadband technologies. Therefore the Welsh Government is seeking to further support the infrastructure programme through assisting SMEs to efficiently use superfast broadband technologies for business gain – The SBBE programme.

The *Digital Maturity Survey* addresses the need for further data on business exploitation of superfast broadband and associated technologies. The purpose of the research is therefore one of addressing this weakness to both inform Welsh Government policy and to contribute towards the emerging evidence base on broadband, ICT and economic development/impact.

1.3 Survey methodology

The survey was disseminated to businesses across Wales electronically, with the aid of research partners such as all 22 Local Authorities across Wales, Business Wales, Federation of Small Businesses (FSB) Wales, The Electronic and Software Technologies Network for Wales (ESTnet), Construction Excellence Wales (CEW), and National Farmers Union (NFU) Cymru. A total of 166 usable questionnaire responses were achieved at close of survey in November 2016 (see Table 1-1).

Table 1-1 Survey respondents

Adopter Status¹	Number of SMEs	% of SMEs
Superfast broadband adopters	57	35
Standard broadband	97	59
No broadband	10	6
Location: EU region		
West Wales and the Valleys	99	60
East Wales	67	40
Location: sub-region		
Mid Wales ²	31	19
North Wales ³	45	27
South East Wales ⁴	69	42
South West Wales ⁵	21	13
Location: Urban/ Rural⁶		
Urban	96	58
Rural	70	42
Employment		
Micro (0 to 9 employees)	123	74
Small (10 to 49)	21	13
Medium (50 to 249)	11	7
Unknown	11	7
Sector (SIC 2007 category)		
Production and construction (SIC A-F)	19	11
Retail, wholesale and transport (SIC G/H)	21	13
Accommodation and food services (SIC I)	27	16
Information and communication (SIC J)	26	16
Business and professional services (SIC K-M)	41	25
Other services (SIC N-S)	32	19

Notes:

- Two returns had an 'unknown' broadband status. 'Superfast' is defined as being able to achieve broadband download speeds of 24Mbps or more.
- Mid Wales includes the local authorities of Powys and Ceredigion.
- North Wales includes the local authorities of Anglesey, Conwy, Denbighshire, Flintshire, Gwynedd and Wrexham.
- South East Wales includes the local authorities of Blaenau Gwent, Bridgend, Caerphilly, Cardiff, Merthyr, Monmouthshire, Newport, Rhondda Cynon Taf, Torfaen and Vale of Glamorgan.
- South West Wales includes the local authorities of Carmarthenshire, Neath Port Talbot, Pembrokeshire and Swansea.
- Respondent postcodes were utilised to classify by rural/urban classifications as presented in Regional Trends (ONS) 43, 2010/11. "Town and fringe less sparse" located SMEs were included in the Urban classification. http://www.neighbourhood.statistics.gov.uk/HTMLDocs/images/rt43-rural-urban-areas_tcm97-107562.pdf (last accessed 26/01/17).

The results are presented according to size, sector and geography. This analysis also includes an assessment according to the level of digital maturity. Full details of the survey methodology can be found in Annex 1 of the report. Care is needed in interpreting the results of this survey, given the response achieved. It has not been possible, for example, to conduct detailed analysis of digital maturity in local areas, or particular sub-sectors. Indeed any extrapolation of findings from this data, beyond that presented in this report, should be treated with caution. Cardiff Business School's aspiration in future years will be to secure a greater response, for improved representativeness.

1.4 Structure of report

The report is structured as follows. Section 2 sets out the conceptual framework for the survey. This is followed by descriptive results from the 2016 Survey (Section 3), a more detailed analysis (Section 4), and the digital dashboard for Wales (section 5). The report concludes with implications/lessons for subsequent research (section 6).

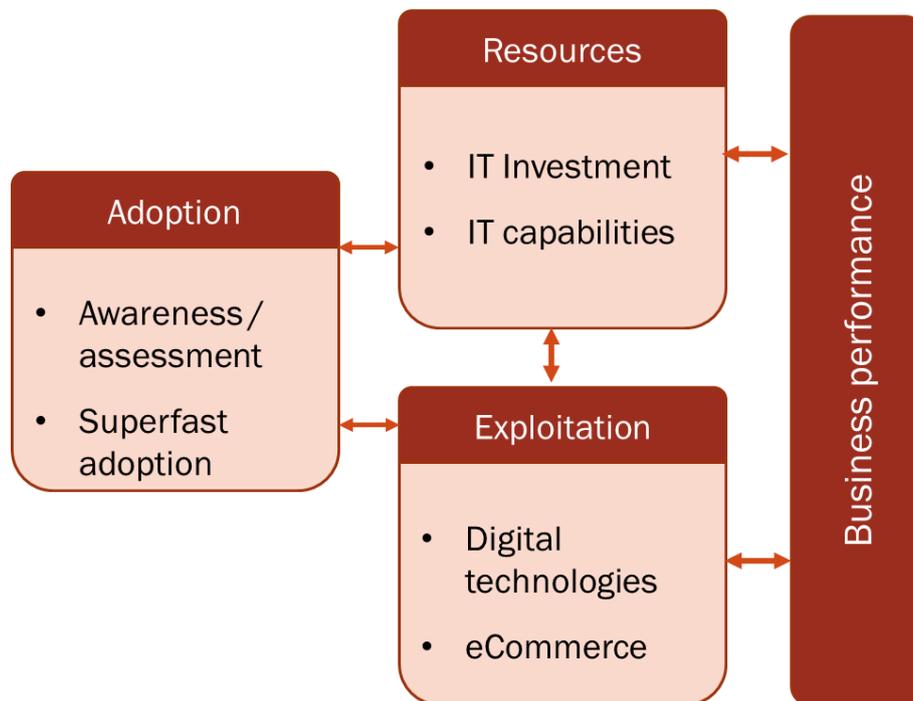
2 Digital maturity conceptual framework

2.1 Introduction

This section of the report sets out the conceptual framework adopted for the study, and its associated elements: adoption, resources, exploitation and performance. Superfast broadband represents an important enabling technology, underpinning the growth and development of SMEs and economies. Alongside other digital technologies, superfast broadband has the potential to disrupt existing sectors, and open up the potential for new economic activities. Such technologies help to provide vital connectivity and a platform for new digital products and service developments. Digital maturity has been introduced as a concept to describe the capabilities that underpin the growth of SMEs. Such models emphasise the varying levels of adoption and use of digital technologies across business activities, and provide a mechanism for benchmarking against other SMEs, sectors and economies.

The framework adopted for the annual *Digital Maturity Survey* is set out in the Figure 2-1. This framework has been developed from a review of existing studies on digital maturity, and is intended to reflect the processes by which superfast broadband adoption both shapes, and is shaped by, a SME's resources, the use and exploitation of broadband, and the subsequent performance impact.

Figure 2-1 Digital maturity framework



The key features of the framework are discussed below, including a review of findings from earlier research, and the survey topics that emerge.

2.2 Adoption

An important feature of digital maturity is the ability of SMEs to access superfast broadband. Access, however, requires there to be appropriate provision within a geographical area, at an affordable level (OECD, 2015). These factors shape a SME's propensity to connect. They can also shape a SME's location decisions, particularly where access, speed and services vary across geographical space (Grubestic and Mack, 2015).

Previous research (Martin and Matlay, 2001) has suggested that adoption decisions are shaped by a complex range of factors, including SMEs':

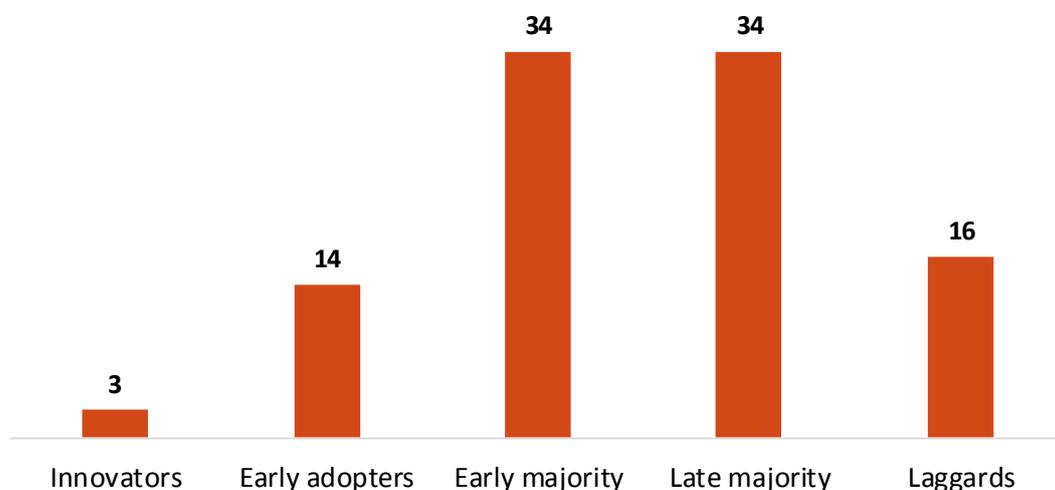
- Perceived benefits of new technologies against those of existing technologies
- Level of digital skills within the employee base
- Presence of a 'champions' to facilitate adoption and promote awareness, for example, the Chief Executive Officer

- Pressure from external stakeholders, such as customers and suppliers, who wish to interact with the business using digital technologies
- Context factors such as the regulatory and economic climate, shaping adoption and use
- Size factors, with larger and growth-oriented SMEs likely to make greater use of ICT applications and functions

Linear models have been developed to indicate different types of adoption and associated digital maturity, for example, the Department for Trade and Industry (DTI) *Adoption Ladder*. Their use, however, has been criticised as they imply a natural course of progression for all SMEs, irrespective of their size, sector, economic factors and so on (Martin and Matlay, 2001).

Adoption patterns can be modelled using the concept of the technology adoption curve. Such models place emphasis on innovators and early stage adopters, that are the first groups to adopt, the subsequent majority of adopters (sometimes split into an early and later majority), and laggards. This can be presented as a standard bell curve to illustrate the distribution pattern of adopters (Figure 2-2).

Figure 2-2 Typical innovation adoption curve (% of adoptions)



Adapted from Rogers (2003)

The key 'adoption' themes considered in the *Digital Maturity Survey* are therefore:

- Superfast broadband adoption by SMEs in Wales
- Awareness and assimilation of broadband by SMEs in Wales

2.3 Resource

Digital resources have been identified as an important source of competitive advantage for SMEs. They include digital infrastructure (physical assets and software) and staff IT capability. These resources, as noted in the Adoption section, help to underpin digital maturity within a SME.

Digital infrastructure is increasingly enabled by the connectivity provided by superfast broadband, proving the potential to exchange information and communicate with customers, suppliers and stakeholders in new ways. In developing infrastructure, however, it is recognised that time and learning are required, as the purchase of infrastructure does not automatically convey competency on SMEs and their employees (Bharadwaj, 2000).

IT staff capability refers to the knowledge and skills of staff within a SME, and their ability to use and exploit digital technologies. The potential for a SME to absorb new IT is dependent on prior experience and 'comfort' in using such technologies. While this capability may be linked to the presence of skilled IT staff (Ross et al., 1996), it is also embedded within the awareness and skills of the wider employee base. Indeed, in small SMEs this competency will be associated with a small number of individuals or the SME's owner.

The key 'resource' themes considered in the *Digital Maturity Survey* are therefore:

- IT investment by SMEs in Wales
- IT capabilities of SMEs in Wales

2.4 Exploitation

The exploitation of superfast broadband is based not only on SMEs adopting new technologies, but also making use of them in their business processes. The extent and nature of this use has been found to vary by sector, with some sectors such as financial services, information, professional, scientific and technical services, and other so-called 'knowledge intensive business services' reporting particularly high levels (Grubestic and Mack, 2015). The scope of digital technologies in use has been a significant growth area in recent years, with the digital maturity of SMEs illustrated by the growing adoption of superfast broadband, and enabled technologies such as cloud computing (OECD, 2015).

ICT and broadband, as noted above, represent important enabling technologies. In this respect they have the potential to impact across a wide range of sectors and uses. These impacts have been studied in relation to profit, cost reduction, sales and productivity growth. They have also been identified in areas such as organisational capabilities and innovation (Gray, 2006). These impacts can include the development of new and improved products, processes and services (Zammuto et al., 2007), but also new forms of communication with suppliers and partners (Corso et al., 2003).

The key 'exploitation' themes considered in the *Digital Maturity Survey* are therefore:

- Digital technology use by SMEs in Wales
- E-commerce capability by SMEs in Wales

The following sections of the report set out the results and analysis of the *Digital Maturity Survey 2016*, with reference to the framework themes identified.

3 Descriptive results

3.1 Introduction

This section details the main findings from the 2016 Survey. Following the Digital Maturity conceptual framework used in this report, the results are broken down into three parts: Adoption; Resources; and Exploitation.

Adoption. The breakdown of SMEs by whether they have superfast broadband (defined as SMEs being able to achieve download speeds of at least 24Mbps), standard broadband or no broadband at all is explored. This was calculated for the sample as a whole, and then by size (number of employees), industrial sector, regions and urban/ rural location. Actual achieved average download speeds reported by the SMEs are then presented, followed by a breakdown of broadband providers used by the responding SMEs.

Resources. Here, the survey results on IT investment by SMEs in Wales are used to indicate the proportion of respondents with a dedicated IT budget; the average annual infrastructure investment (per SME and per full time equivalent [FTE worker]); and average broadband subscription spending per month. IT capabilities are then examined, with findings on IT skills, cloud capabilities (both at the business premises, and to enable working from home), access to IT support and whether the SMEs have a staff development budget, being presented.

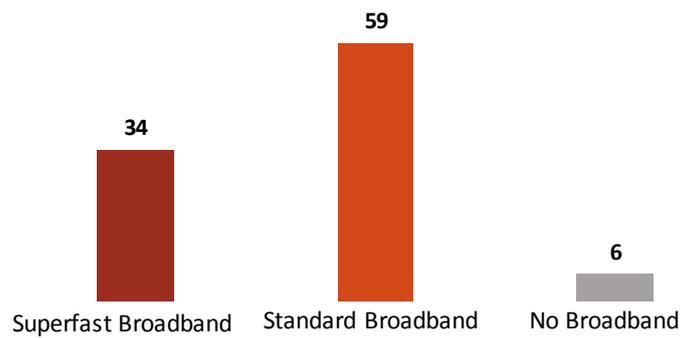
Exploitation. The degree of exploitation of broadband enabled technologies is examined through the themes of digital technology usage (cloud packages and services), and e-commerce capability (use of websites, percentage of total sales serviced on-line and percentage of purchases transacted on-line).

The survey achieved 166 responses. Table 1-1 details the basic breakdown of the responding SMEs by adopter status, location, employment size and industrial sector.

3.2 Adoption

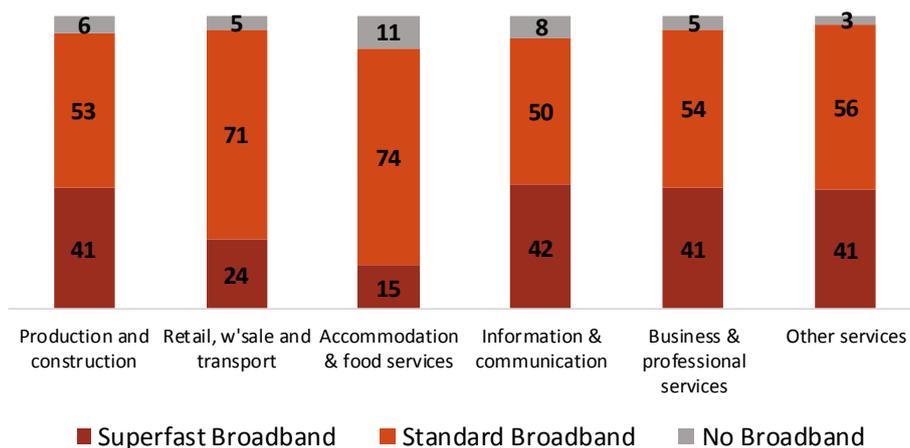
Superfast broadband. Just over a third of SMEs responding to the survey had superfast broadband (35%). Nearly three in five of the SMEs (59%) are shown in Figure 3-1 to have only standard broadband, with the remaining 6% reporting having no broadband at all.

Figure 3-1 Adoption of superfast broadband (% of SMEs)



The adoption of superfast broadband, shown by industrial sector in Figure 3-2, was relatively low in “accommodation and food services” (where 15% of all the SMEs in the category had superfast broadband) and “retail, wholesale and transport” (24%). The “accommodation and food services” category also had the highest percentage of SMEs with no broadband at all (11%).

Figure 3-2 Adoption of superfast broadband by sector (% of SMEs)



By size, 30% of micro sized SMEs, 57% of small and 70% of medium had superfast broadband. Micro SMEs were most likely to have no broadband at all (7% of all SMEs in this category). By sub-region, the percentage of SMEs with superfast broadband ranged from a low of 30% in Mid Wales, to a high of 38% in South West Wales. North Wales had the highest percentage with no broadband, at 11%.

SMEs based in urban areas were more likely to have adopted superfast broadband than those in rural areas. Figure 3-3 indicates that 40% of urban SMEs had superfast broadband, as compared to 28% of rural SMEs. Comments received through the survey from rural based SMEs reflect that there is strong demand for superfast broadband in these areas, but this demand has been frustrated by supply. Perceptions around Superfast in rural areas were summarised by a number of respondents:

"...this feature, which I would be delighted to pay for, only applies in towns not in rural communities which are still suffering from low speeds and no idea when and if superfast will become available..." [North Wales, accommodation provider]

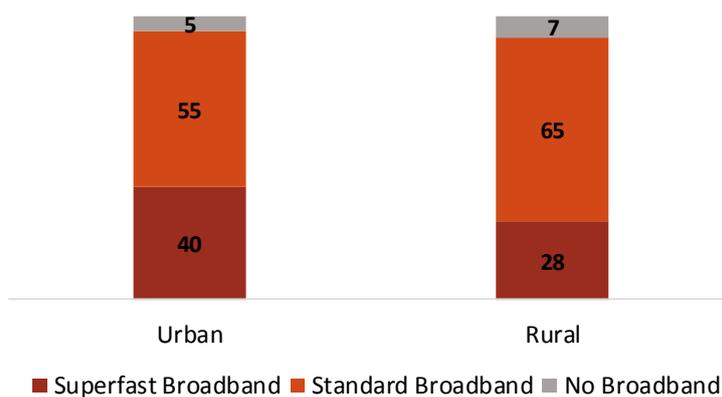
"...Improved broadband will be crucial to the long term prospects of our business because of our remote location..." [Mid Wales, manufacturer]

"...Small rural communities have been left behind in the roll-out of Superfast and this has now left rural communities at a disadvantage once again..." [West Wales, commercial site services]

"...It is absolutely essential for mid-Wales. Road and rail are both poor and airports are distant. Superfast is the only piece of infrastructure that can really help us and it is very slow coming..." [North Wales, holiday provider]

"...Rural areas such as us need to diversify if we are to bring new lifeblood into the area. We cannot do this without technology..." [South East Wales, professional services]

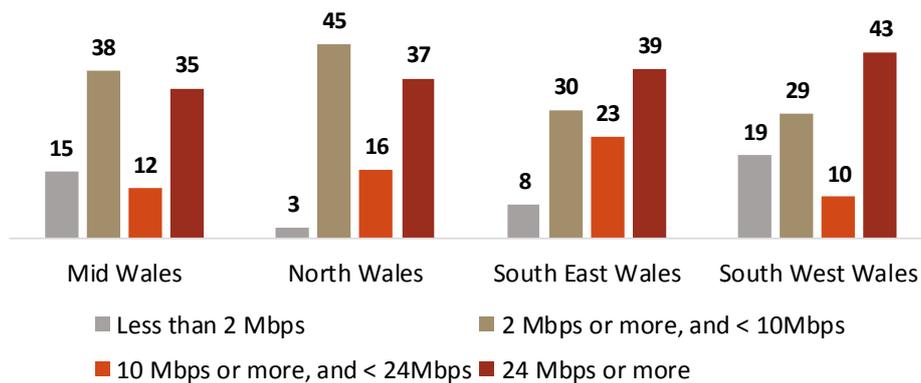
Figure 3-3 Adoption of superfast broadband by urban/rural location (% of SMEs)



Average achieved download speeds. Figure 3-4 shows a relatively high percentage of SMEs in Mid Wales (15%) and South West Wales (19%) reported achieving an average download speed of less than 2Mbps. A majority of SMEs in North Wales (45%) noted broadband download speeds of between 2Mbps and less than 10Mbps.

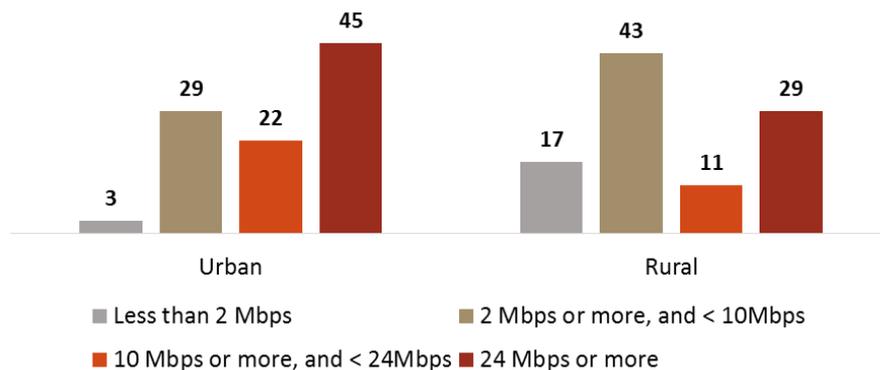
By size, medium SMEs were most likely to report speeds of 24+Mbps (80% of SMEs in the category), with small (53%) and micro (35%) somewhat behind. By sector, a relatively large 22% of the sample in the "accommodation and food services" category reported an average speed of less than 2Mbps (this will in part be due to the sometimes-remote nature of holiday accommodation in areas).

Figure 3-4 Average achieved download speed by sub-region (% of SMEs)



SMEs based in rural areas tended to report relatively slower average achieved download speeds. Figure 3-5 shows that three-fifths of rural based SMEs (60%) had only achieved an average download speed of less than 10Mbps. The comparative figure for SMEs located in urban areas was 32%.

Figure 3-5 Average achieved download speed by urban/rural location (% of SMEs)



Respondents noted that speed of download was not necessarily the only important factor for their business :

"...Fast, reliable internet connections are essential for business, but the reliable bit is the important thing..." [Mid Wales, IT business]

"...Although our broadband is supposedly Superfast, it is extremely unpredictable..." [South East Wales, arts business]

"...we would be over the moon if we could rely on 2Mbps download speed..." [Mid Wales, transport business]

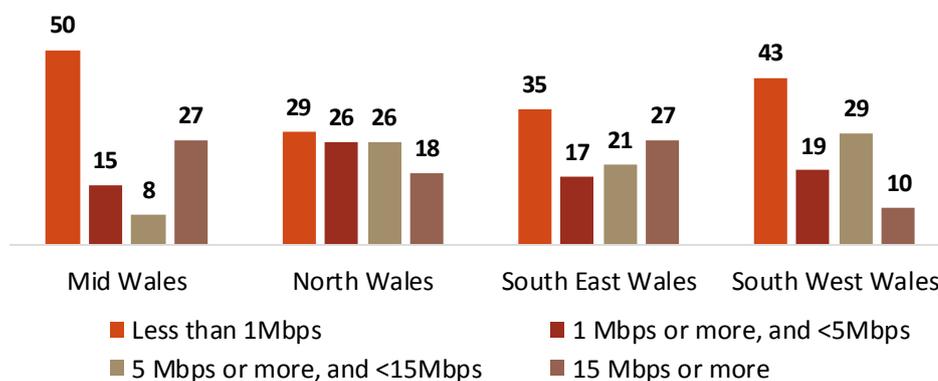
"...the broadband in town is too prone to stoppages threatening the existence of the business..." [Mid Wales, business services]

Average achieved upload speeds. A relatively high proportion of firms in Mid Wales (50%) and South West Wales (43%), shown in Figure 3-6, reported achieving an average upload speed of less than 1Mbps. Half of the respondents from South East Wales (49%) noted average upload speeds of 5Mbps or more. This contrasts with just 35% of Mid Wales firms achieving a similar upload speed.

Medium sized firms were most likely to report average upload speeds of 15Mbps or more (70% of firms in this category), with small (37%) and micro sized (17%) comparatively far behind. Micro firms were most likely to report average upload speeds of less than 1Mbps (41%, compared to small 32% and medium 10%).

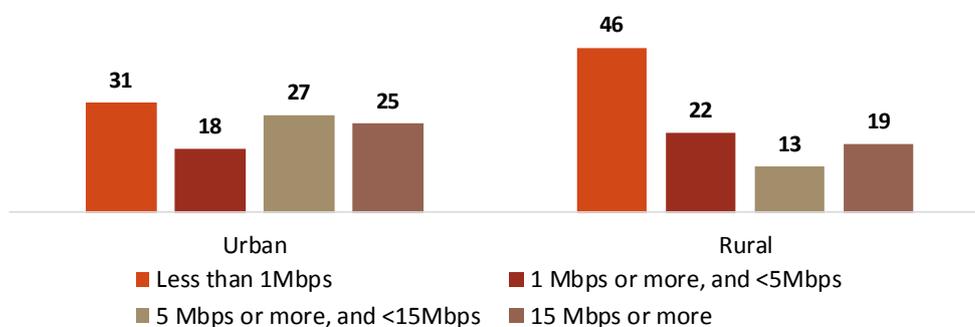
Over half (52%) of “accommodation and food services” firms reported average upload speeds of less than 1Mbps (as with download speeds, the relative remoteness of some holiday accommodation may be a factor in this).

Figure 3-6 Average achieved upload speed by sub-region (% of SMEs)



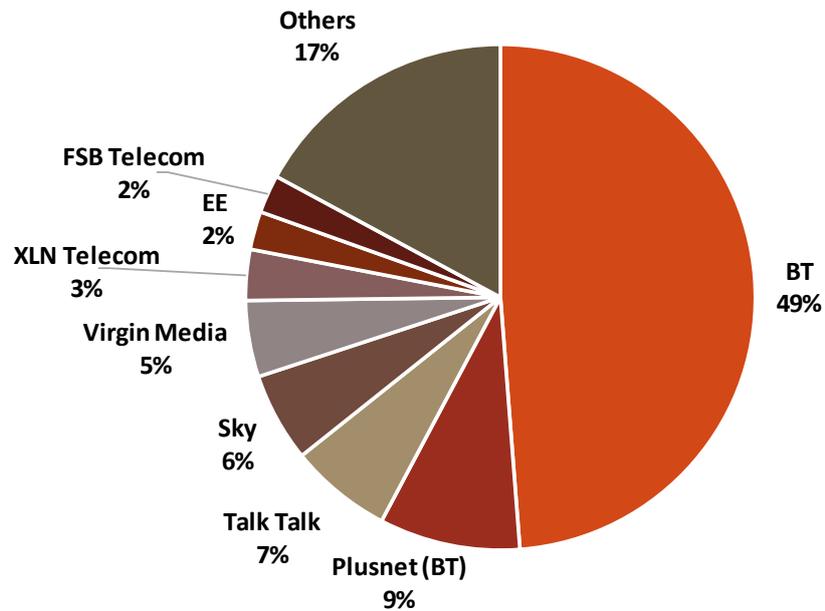
Rural based SMEs were more likely to report relatively slower upload speeds. Figure 3-7 shows that 46% of rural based SMEs achieved average upload speeds of less than 1Mbps, in comparison to 31% of urban based SMEs.

Figure 3-7 Average achieved upload speed by urban/rural location (% of SMEs)



Broadband providers. Nearly half of the SMEs in the sample reported that BT was their broadband provider (49%), with a further 9% noting Plusnet (also a part of BT). SMEs also named Talk Talk (7%) and Sky (6%) and Virgin Media (5%) amongst the most used. The “Others” category in Figure 3-8 includes all the broadband providers who received just a single mention.

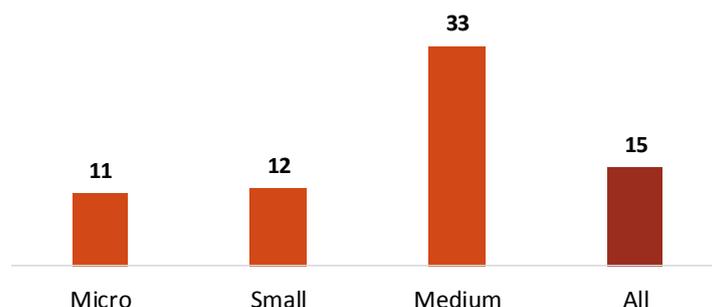
Figure 3-8 Broadband providers to respondents (% of SMEs)



3.3 Resources

Dedicated IT budget. Only 15% of sampled SMEs reported having a dedicated IT budget. Figure 3-9 shows that by number of employees, medium sized SMEs were the most likely to report that they had a dedicated IT budget (33%, compared to just 11% of micro sized SMEs).

Figure 3-9 SMEs with a dedicated IT budget by firm size (% by category)

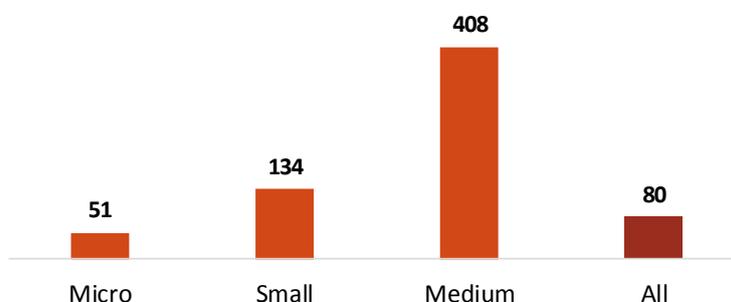


By sector, *"information and communication"* (23%) and *"wholesale, retail and transport"* (21%) SMEs were most likely to have an IT budget -with *"business & professional services"* and *"other services"* the least likely (both 11%).

There was minimal difference between sub-regions, and regions of Wales (East Wales 14%; West Wales and the Valleys 15%) when the existence of a dedicated IT budget was explored. Urban based SMEs were more likely to report having an IT budget than rural based (17% and 12% respectively).

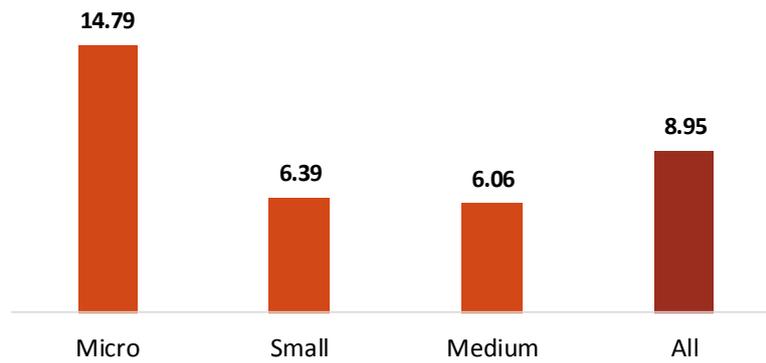
Broadband subscriptions. As may be expected, in absolute terms, medium sized SMEs spent more on broadband subscriptions, on average, than micro SMEs. Figure 3-10 shows an average of £51 per month was spent by micro SMEs, with this Figure increasing to £408 per month for medium sized SMEs.

Figure 3-10 Average broadband subscription spend by business size (£ per month)



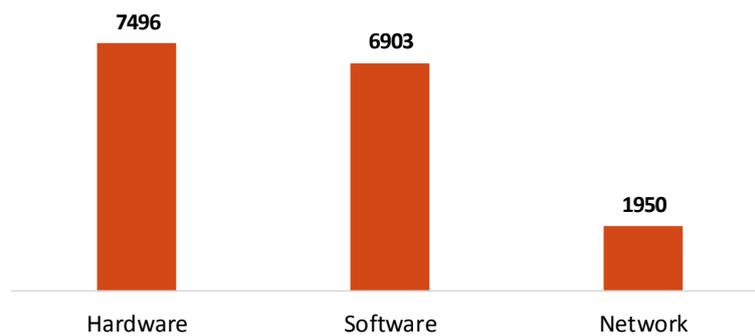
However, Figure 3-11 shows that micro SMEs have a higher average spend per worker on monthly broadband subscriptions than medium SMEs (£14.79 per month, compared to £6.06). Economies of scale may be a factor in this.

Figure 3-11 Average broadband subscription spend per FTE worker by business size (£ per month)



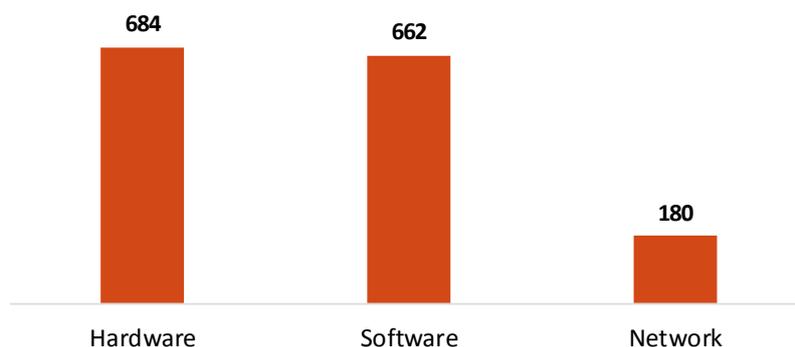
IT infrastructure investment. Respondents were asked to indicate for their SME the average annual spend, over the last three years, on the IT infrastructure related items of hardware, software and network. Using these data, Figure 3-12 shows that SMEs spent an average of nearly £7,500 per year on hardware and around £6,900 on software.

Figure 3-12 Average spend on IT Infrastructure per SME (£ per year)



Further analysis was then undertaken to derive annual infrastructure investment figures per full time worker. Figure 3-13 shows that an average of £684 per full time equivalent worker was spent per year on hardware related items, £662 on software and £180 on networks.

Figure 3-13 Average spend on IT infrastructure per FTE worker (£ per year)



IT skills and cloud capabilities. In 56% of the respondent SMEs, more than half of the workforce had intermediate¹ or higher levels of IT skills. Figure 3-14 shows that, by sub-region, SMEs based in South East Wales and South West Wales were the most likely to report having more than half of their staff with intermediate or above levels of IT skills (63% and 60% respectively).

By sector, 95% of SMEs in the “*information and communication*” sector had at least half of their workforce with intermediate level IT skills, while this percentage dropped to 27% in “*accommodation and food services*”, and just 25% in the “*production and construction*” sector.

Micro sized SMEs were more likely to have more than half of their workforce IT trained to an intermediate level (63%), than small (32%), or medium sized SMEs (18%).

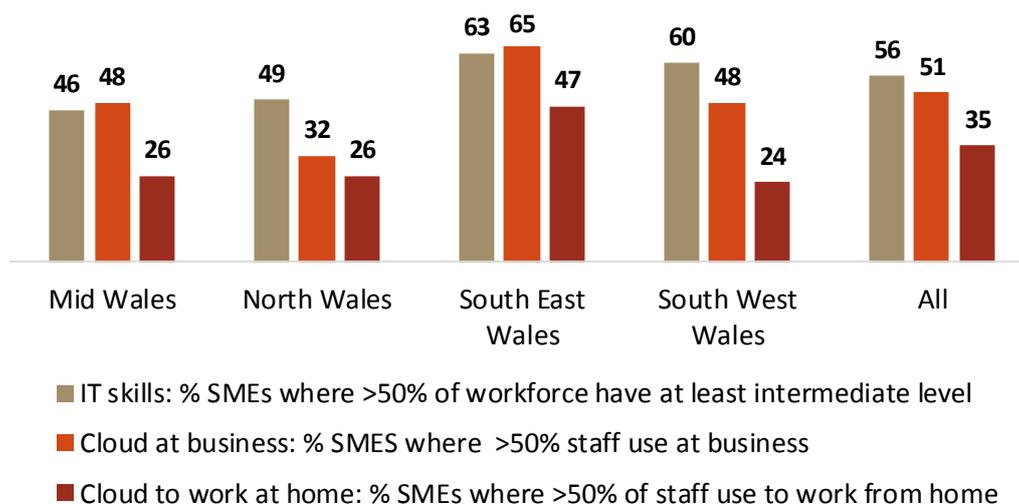
Nearly two-thirds of urban based SMEs (64%), but only just over two-fifths of rural SMEs (42%), had more than half of their staff with intermediate or above IT skills.

Figure 3-14 also shows the percentage of SMEs where more than half of the workforce were able to use cloud enabled services at the business premises. The average for the whole respondent sample was 51%. The percentage of SMEs in North Wales having this level of capability was a relatively low 32%. There was little variation in cloud enabled services capabilities at the business premises when the wider EU regional grouping was examined - East Wales 53%; West Wales Wales and the Valleys 49%.

By sector, “*production and construction*” (25% of SMEs) and “*accommodation and food services*” (24% of SMEs) had the lowest cloud capabilities. Micro SMEs exhibited relatively high cloud at the business capability with 54% of SMEs stating that more than half of their workforce were able to use at the business premises. This compares to 35% of small sized SMEs and 30% of medium. The comparative figures for urban and rural cloud at the business capability were 65% and 32% respectively.

¹ Intermediate computer skills include the working knowledge of the operations of the internet and email, computers, word processing, graphics and multimedia, and spreadsheets and databases.

Figure 3-14 IT skills and cloud capabilities (% of SMEs)



Finally in Figure 3-14, the capability of utilising cloud enabled services to work from home are shown. In South East Wales, 47% of SMEs stated that more than half of their workforce used cloud enabled services to work at home - this compared to just 24% of SMEs in South West Wales. Nearly two-in-five micro sized SMEs (39%) reported having this level of capability, compared to 11% of medium sized SMEs.

By sector, SMEs in “*information and communication*” and “*business and professional services*” were the most likely to report the ability to use cloud enabled services to work from home (55% and 52% of SMEs, respectively, indicating that more than half of their workforce were able to do so). Amongst rural SMEs, 20% had the capability for more than half of their staff to work from home, via cloud services, compared with 44% of urban-based SMEs.

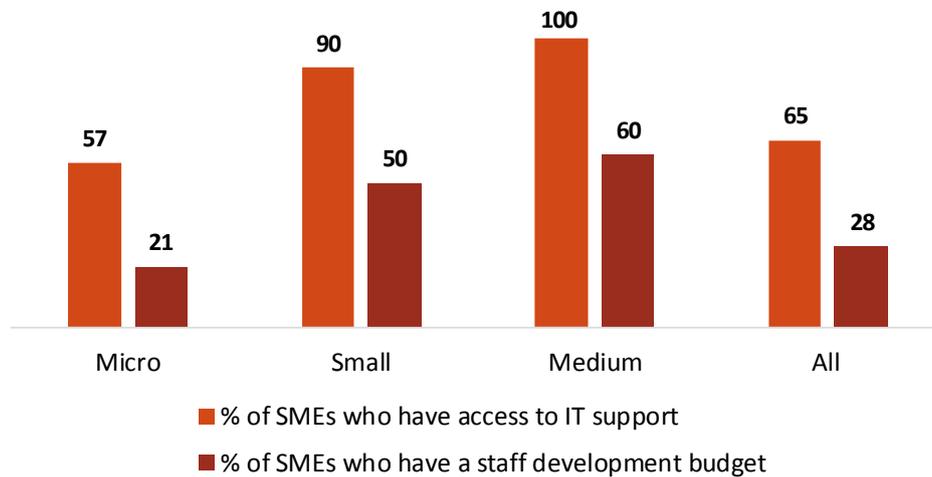
IT support capabilities. Figure 3-15 illustrates that nearly two thirds (65%) of the respondent SMEs noted having access to IT support (whether in-house or sub-contracted to an external provider). The percentage of SMEs having IT support was highest for medium sized SMEs (100%) and lowest for micro sized (57%).

By sector, 52% of “*other services*” SMEs had IT support (as compared to 85% for “*information and communication*” sector SMEs and 71% of “*production and construction*” SMEs). By sub-region, there was little difference across the areas (low: South East Wales 61%; high: South West Wales 67%). By area, 68% of rural SMEs and 61% of urban SMEs reported having access to IT support.

Figure 3-15 also shows that two-thirds (60%) of medium sized SMEs had a staff development budget, compared to just over one-in-five micro SMEs (21%). Relatively high percentages of SMEs with staff development budgets were found in South West Wales (35%) and South East Wales (32%), while the comparative figure for Mid Wales was found to be relatively low at just 15%.

By sector, the highest percentages were found in “*information and communications*” and “*other services*”, with 44% of SMEs in each category having a staff development budget. Nearly one-in-five rural SMEs (19%) and one-in-three urban SMEs (34%) reported having a staff development budget.

Figure 3-15 IT support and staff development budgets by business size (% of category)



3.4 Exploitation

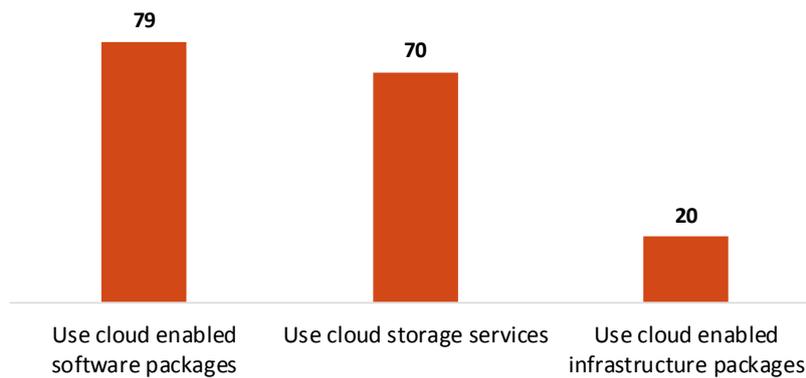
Use of digital technologies: cloud enabled packages and services. A majority of SMEs reported using cloud software packages, with Figure 3-16 showing that 79% used at least one. Some 70% of SMEs indicated they used a broadband enabled cloud storage service.

Only one-in-five SMEs (20%) reported using cloud enabled infrastructure packages.

By SME employment size, there was little difference in usage of cloud enabled software packages or cloud storage services. Medium size SMEs were more likely to use infrastructure packages (36%) than micro (18%) or small (20%) SMEs.

Rural based SMEs were less likely to use cloud enabled software packages and cloud storage services than urban SMEs, although they did report higher usage of cloud enabled infrastructure packages (25% rural, 17% urban).

Figure 3-16 Use of digital technologies: cloud enabled packages and services (% of SMEs)



Use of digital technologies: cloud enabled generic business applications. Figure 3-17 shows that, in exploiting cloud enabled generic business applications, nearly a fifth (17%) of SMEs reported using Contact Relationship Management (CRM) software. Just 10% of SMEs used cloud enabled large scale data transfer applications (perhaps not too surprising given that this facility tends to be utilised by a select cohort of SMEs, such as those involved in media).

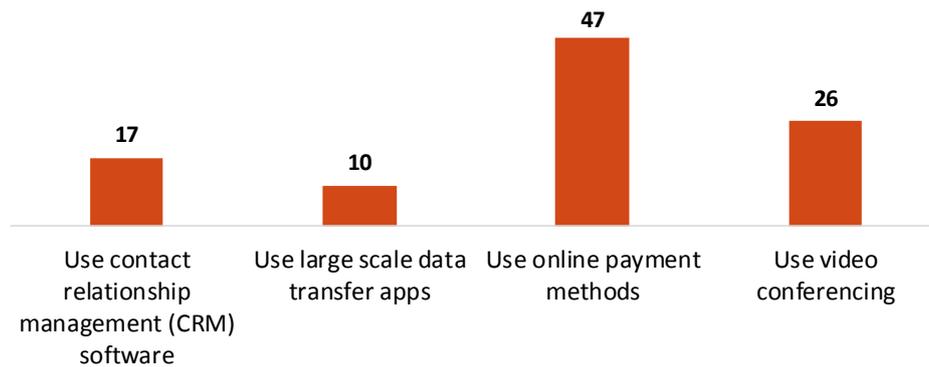
Online payment methods facilitated by the cloud were used by nearly half of the SMEs responding (47%); while just over a quarter used video conferencing (26%).

SMEs of medium employment size were more likely to use CRM software (27%, as compared to small 20%, micro 15%), and online payments (55% of medium SMEs, 50% of small, and 46% of micro). Micro SMEs were more likely to utilise video conferencing (28%, compared to 18% of medium sized).

There were just slight differences in the regional proportions of usage of cloud enabled generic business applications- the largest being in the usage of large scale data transfer applications in East Wales (at 13% of SMEs) which was observed to be 4 percentage points higher than in West Wales and the Valleys (9% of SMEs).

Rural SMEs were more likely to use cloud enabled online payment methods than urban based SMEs (50%, as compared to 43% of urban), but were less likely to utilise video conferencing (rural 19%, urban 31%).

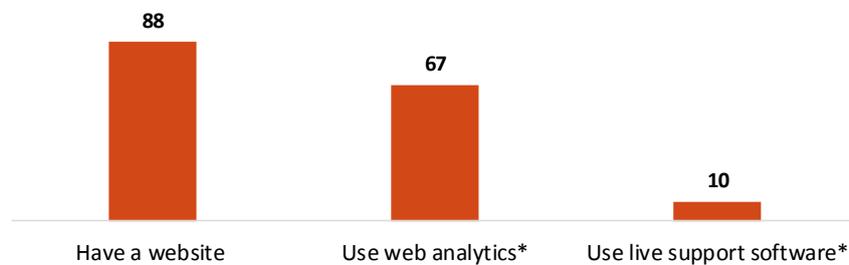
Figure 3-17 Use of digital technologies: cloud enabled generic business applications (% of SMEs)



Use of E-commerce: websites. Figure 3-18 shows that nearly nine out of every ten SMEs responding to the survey (88%) had a website. Just over two-thirds (67%) reported that they used web analytical tools to evaluate web site data (with SMEs predominantly mentioning Google Analytics here). Some 10% of SMEs noted using live support software ('Live Chat') on their website to provide instant online assistance to users.

SMEs in the "accommodation and food services" (96%) and "retail, wholesale & transport" (95%) sectors were most likely to have a website. A smaller percentage of SMEs in the "business & professional services" (84%) and "other services" (81%) categories reported having a website presence.

Figure 3-18 Use of e-commerce: websites (% of SMEs)



* Only includes SMEs with a website

By size, 86% of micro, 95% of small and 100% of medium SMEs reported having a website. By sub-region, the comparative figures were 97% of SMEs in Mid Wales and 83% in South East Wales. Some 88% of urban and 89% of rural SMEs had a website.

Use of E-commerce: Sales serviced online. Nearly half of the SMEs in the sample (49%) did not sell online during their last financial year, while Figure 3-19 illustrates one-in-five SMEs (22%) reported that over half of their total sales were serviced through online ordering or payment systems.

By size, micro SMEs were more likely to service a higher percentage of their total sales online, and SMEs based in the sub-regions of South West Wales and Mid Wales similarly tended to have higher proportions of online sales in their total sales mix. Nearly a third of rural SMEs (32%) serviced more than half of their sales online. The comparative figure for urban-based SMEs was 14%.

Figure 3-19 Percentage of total sales serviced online (% of SMEs)

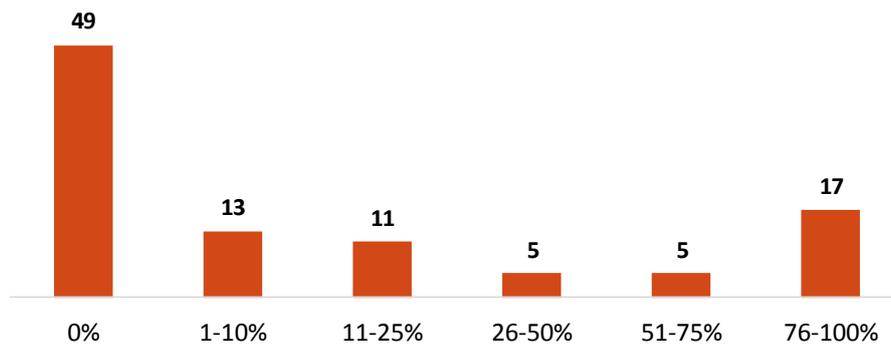
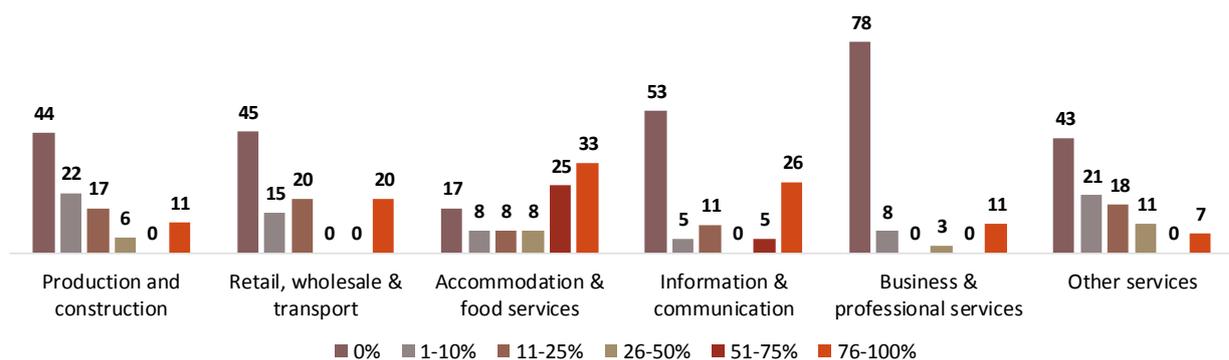


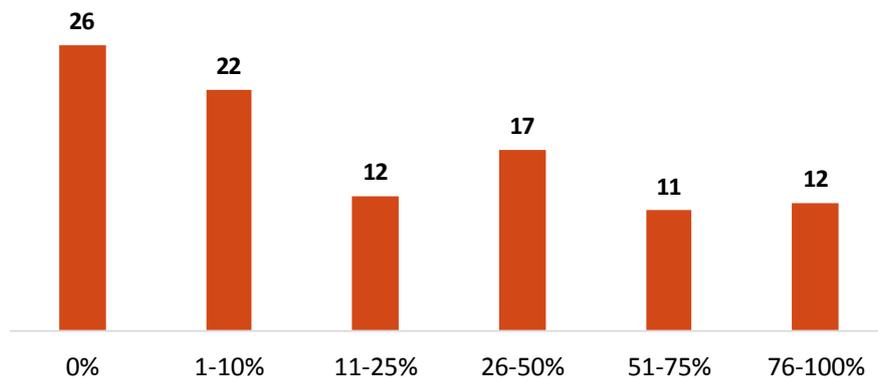
Figure 3-20 highlights that “accommodation and food services” and “information and communication” category SMEs were more likely to service a greater percentage of their sales online. In the former case, 58% of SMEs serviced more than half of their sales online during the last financial year. Contrastingly, 78% of “business and professional services” SMEs did not sell anything online- this potentially having more to do with the ‘bespoke’ nature of the services/products sold by many of the survey respondents in this category, rather than a reluctance to engage with online selling.

Figure 3-20 Percentage of total sales serviced online by sector (% of SMEs)



Use of E-commerce: Purchases transacted online. Just over a quarter of the sample SMEs (26%) did not purchase online. Contrastingly, Figure 3-21 indicates that for 23% of the SMEs, over half of all their purchases were transacted online.

Figure 3-21 Percentage of total purchases transacted online (% of SMEs)



A quarter of micro sized SMEs (26%) transacted more than half of their purchases online (as compared to 17% of small SMEs and 0% of medium sized SMEs)- although a similar percentage of micro SMEs reported making no purchases online. Rural SMEs reported a slightly higher tendency to make a greater proportion of their purchases online than urban SMEs; and by sector the *"information and communications"* category were the most likely to transact more than half of their purchases online (48%). Across the regions, SMEs in Mid Wales reported making greater use of online purchases with a third of SMEs (33%) indicating that more than half of all their purchases were transacted online.

4 Further analysis

4.1 Introduction

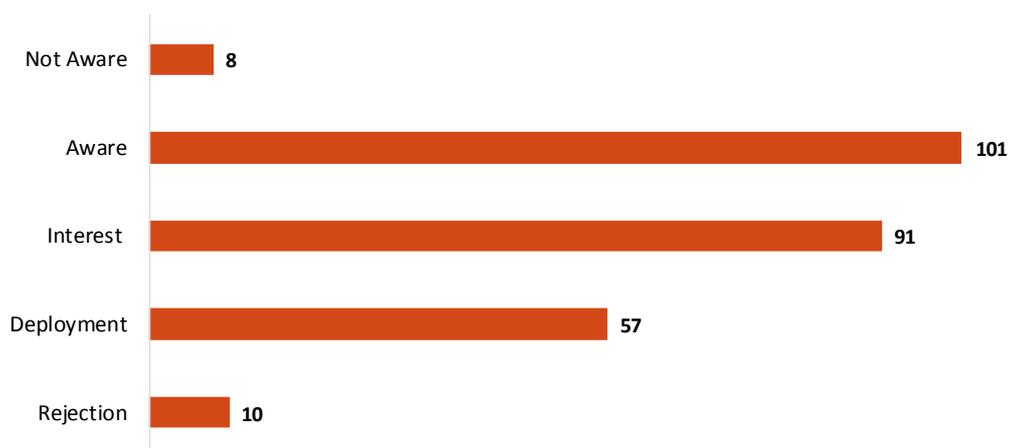
As set out earlier, this section draws on micro-level indicators of digital maturity to analyse the differences among SMEs in the sample in terms of their characteristics and performance. In addition to broadband adoption, IT investment and IT capabilities are introduced to reflect the resources element of the digital maturity framework, while use of digital technologies and use of e-commerce reflect the exploitation element. Compound measures were developed to capture each of the five sub-indicators—broadband adoption, IT investment, IT capabilities, use of digital technologies and use of e-commerce—of digital maturity and subsequently used for the cross-tabulation analysis which formed the basis for the charts presented here.

4.2 Broadband adoption

Broadband adoption refers to whether or not the SME has a fixed internet connection at their main premises in Wales and, if so, of what type. Superfast broadband is defined as an internet speed exceeding 24mbps.

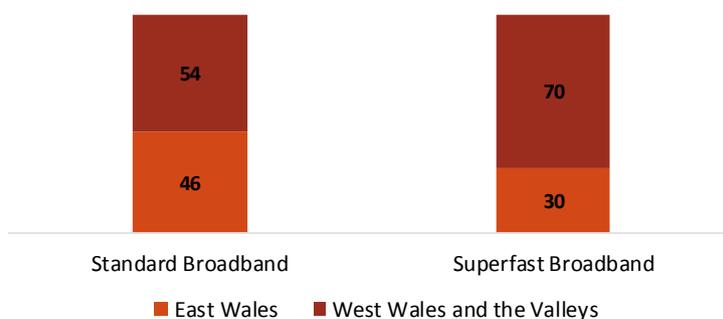
The majority of responding SMEs were standard broadband users but are potentially interested in adopting superfast broadband. Figure 4-1 shows the superfast broadband assimilation stages of 164 SMEs that indicated their adoption status. Superfast broadband adopters represent the 'deployment' stage (57 respondents); SMEs with no broadband represent 'rejection' stage (10 respondents). Standard broadband adopters (97 respondents) form part of the remaining three assimilation stages. The majority of standard broadband users were aware of or interested in adopting superfast broadband, while only eight respondents were unaware of superfast broadband.

Figure 4-1 Superfast broadband assimilation stages (number of SMEs²)



Adoption of superfast broadband depicts regional differences. Figure 4-2 shows that the vast majority of superfast broadband users are concentrated in the EU Convergence area West Wales and the Valleys (70%). Standard broadband users are more evenly spread out across both East Wales and West Wales and the Valleys. This finding is encouraging given the persistent economic problems facing some parts of the convergence area, and with some expectation that business superfast broadband users might be connected with higher levels of labour productivity (see below).

Figure 4-2 Broadband adoption by EU programme region (%)

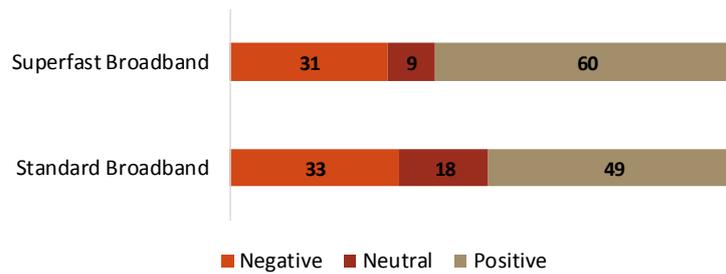


Superfast broadband users tend to be characterised by higher labour productivity growth.

The Digital Maturity Survey showed that 60% of SMEs using superfast broadband have had positive growth in terms of sales per employee in comparison to only 49% of standard broadband users (see Figure 4-3). Some 51% of standard broadband users had either no growth or negative growth in labour productivity, in contrast to only 40% of the superfast broadband users.

² The assimilation stages are not mutually exclusive and may include the same responding SMEs. For instance, the SMEs may be aware of superfast broadband yet reject the adoption. Hence, the figures do not add up to 164.

Figure 4-3 Growth of sales per employee (latest financial year) by type of broadband (%)



SMEs with superfast broadband are more innovation active. As Figure 4-4 demonstrates, SMEs that use superfast broadband are more likely to engage in innovation activity. Figure 4-5 provides more details and reveals that 61% of standard broadband users had generated between one and three new or improved products or services in the last two years. Superfast broadband users, on the other hand, were more active innovators, with 51% of SMEs generating at least four new or improved products or services in the last two years. The findings suggest a connection between broadband speed and improved ability to innovate more frequently. This may be due to the advanced applications that are available online to superfast broadband users.

Figure 4-4 Innovation activity by type of broadband (%)

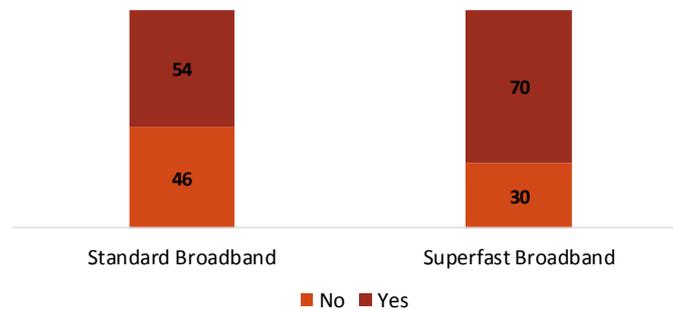
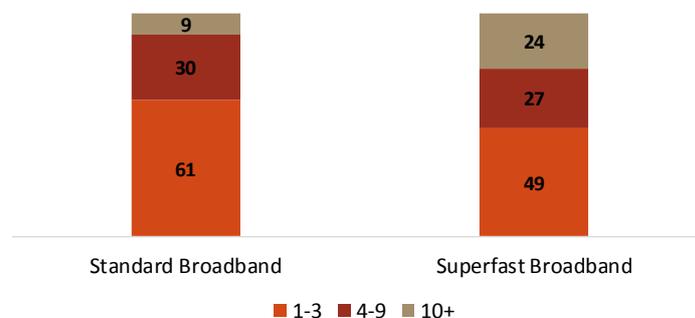


Figure 4-5 Number of innovations (in the last two years) by type of broadband (%)

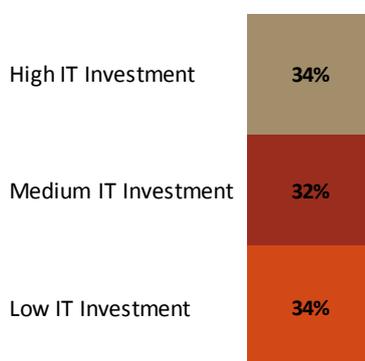


4.3 IT investment

IT investment is defined as the extent of SMEs' expenditure on information technologies. The measure captures SMEs' physical IT-related resources and includes annual spending on broadband subscription, hardware, software and network. To account for SMEs' sizes in the respondent sample, the total annual IT spend was divided by the number of employees. The values below £500 were coded as Low; in the range £500-£1,499 as Medium and above £1,500 as High.

Figure 4-6 indicates that 34% of the sampled SMEs have low IT investment, 32% have medium IT investment, and 34% have high IT investment.

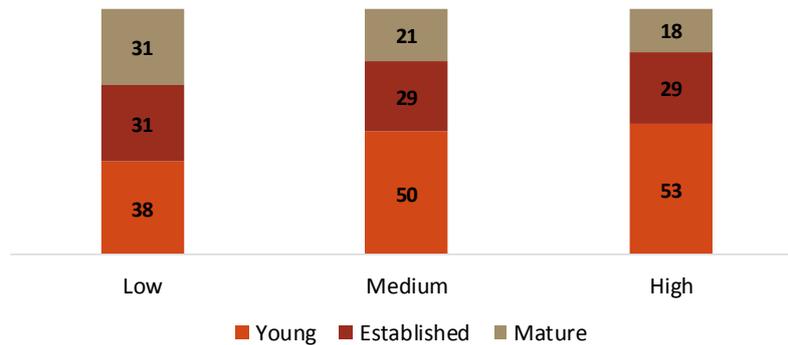
Figure 4-6 Extent of IT investment (% of SMEs)



IT investment is higher among young SMEs. Figure 4-7 shows that half of firms that invest highly or moderately in IT infrastructure are young SMEs, whereas established SMEs tend to invest much less³. Mature SMEs, on the other hand, lean towards low levels of investment. This suggests that the level of IT investment is related to the newness of the SME. Moreover, this may indicate that younger micro firms are paying proportionately more for IT, and are unable to gain the purchasing economies available to larger SMEs.

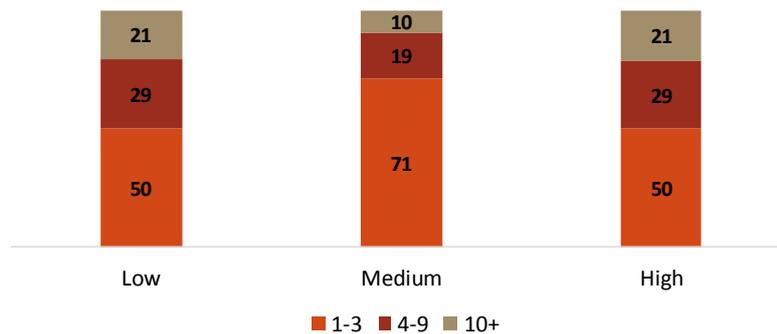
³ Young SMEs are defined as 7 years old and less (founded in the period 2010-2016), established SMEs as 8 to 17 years old (founded between 2000-2009), and mature SMEs as 18 years old and more (founded pre-2000).

Figure 4-7 IT investment by SME age (%)



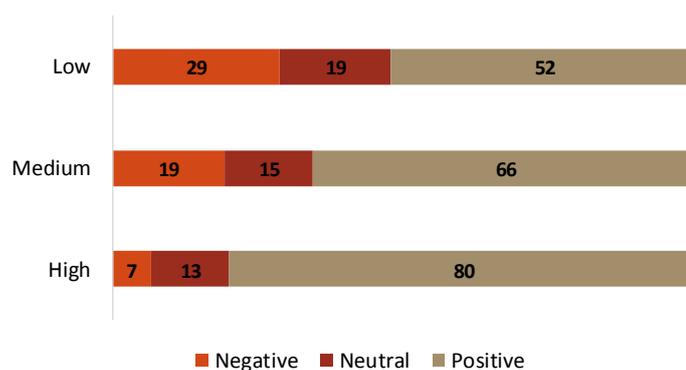
SMEs with low IT investment generate the same number of innovations as SMEs with high IT investment. Figure 4-8 shows that there is little difference between SMEs with low and high IT investment in terms of their innovation performance. This issue will be investigated further in the case studies, but there is a suggestion from the survey respondents that it is not the access to a better physical IT infrastructure, but rather its effective deployment that is critical for innovation.

Figure 4-8 Number of innovations (in the last two years) by IT investment (%)



High IT investment is associated with positive sales growth. Figure 4-9 shows that 80% of SMEs with high IT investment had positive sales growth, compared to 66% of the medium, and 52% of the low IT investment categories. This suggests that high investment in IT infrastructure is a prerequisite for young SMEs to enhance their commercial performance.

Figure 4-9 Sales growth (latest financial year) by IT investment (%)

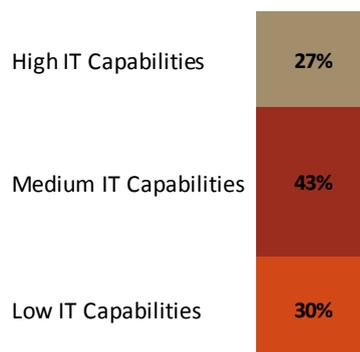


4.4 IT capabilities

IT capabilities are defined as the level of SMEs' human IT-related resources. It is a composite measure based on SME respondents' answers to four questions: 1) IT skills of staff; 2) access to IT support; 3) presence of staff development budget; 4) use of cloud services by workforce.

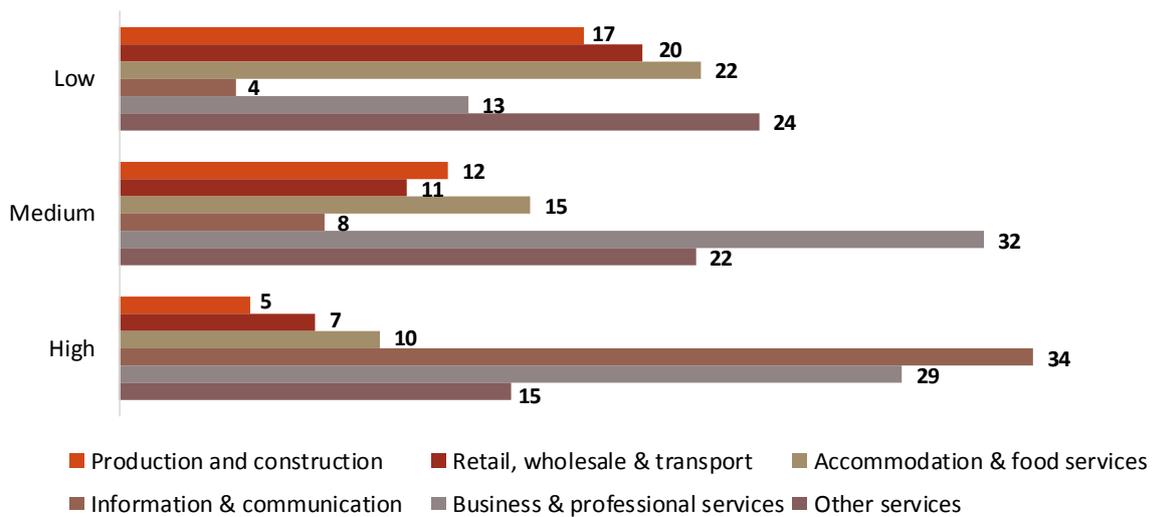
Figure 4-10 indicates that 30% of the sampled SMEs have low IT capabilities, 43% have medium IT capabilities, and 27% have high IT capabilities.

Figure 4-10 Extent of IT capabilities (% of SMEs)



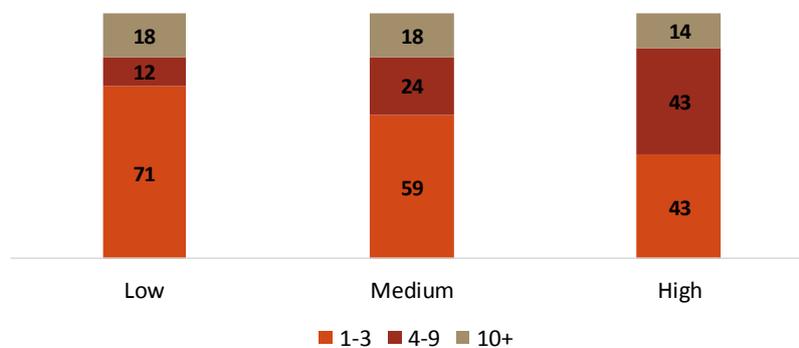
SMEs with high IT capability are concentrated in the information and communication and business services sectors. There was strong expectation that levels of IT capability would vary by industry. For example, Figure 4-11 shows that 34% of high IT capability SMEs were in the information and communication sector, and 29% in the business and professional services sector. Lower levels of IT capability in the production and construction sector were noticeable. For example among the high IT capability group just 5% were in the production and construction sector. Care in interpretation is needed here because of the small underlying sample sizes. However, this finding may reflect less scope to use IT human and physical resources in these firms, but equally could be connected to under-investment in developing IT capability. Once again this will be a research theme that will be explored through the later series of project case studies.

Figure 4-11 IT capabilities by industry sector (% of category)



Higher innovation activity is more prevalent among SMEs with high IT capabilities. Figure 4-12 shows that around 57% of the high IT capability group had generated over 4 new or improved products in the last two years, compared to 30% in the low IT capability group. There is an expectation here that the high IT innovation group contains more firms in ICT and professional and business services, and with the results suggesting that these firms are reporting a higher level of innovative activity.

Figure 4-12 IT capabilities by number of innovations in the last two years (%)



4.5 Use of digital technologies

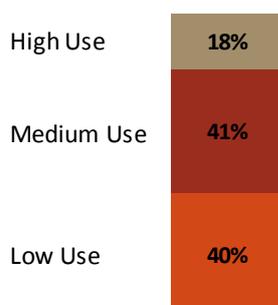
Use of digital technologies is defined as the degree to which SMEs exploit broadband enabled services across various business functions.

Broadband enabled services capture four types of packages: 1) software packages, 2) cloud storage packages, 3) infrastructure packages and 4) generic business service applications. Business functions include Business Management, Production, Purchasing, Distribution and Logistics, Human Resource Management, Accounting and Finance, Marketing, Sales, Research and Development, Information Systems and Technology.

For each package the number of business functions it is used for is summed. Then the sum of all these is calculated to gain an estimate of the SME use of digital technologies.

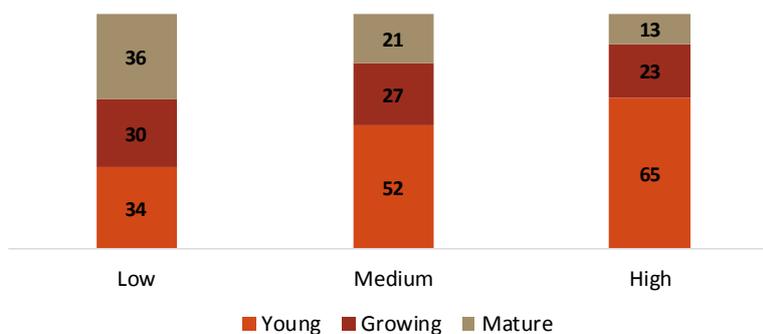
Figure 4-13 indicates that 40% of sampled SMEs are low users of digital technologies, 41% are medium users, and 18% are high users.

Figure 4-13 Use of digital technologies (% of SMEs)



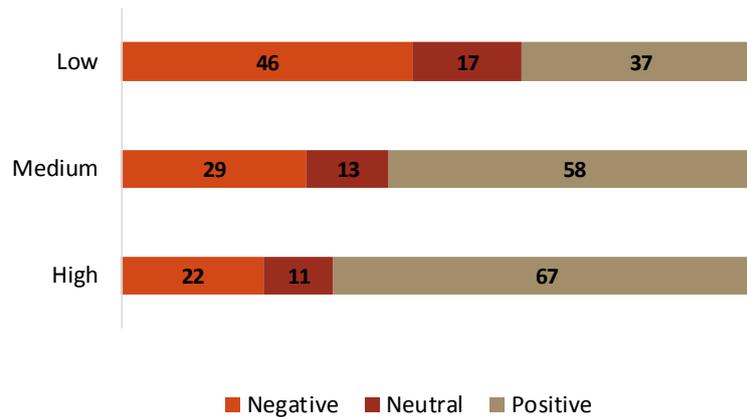
Younger SMEs are more actively engaged with digital technologies. Figure 4-14 reveals that higher users of digital technologies are predominantly younger SMEs (65%). Indeed just 13% of the high use group were classified as mature firms. Turning to the low digital technology users some 36% were mature firms, and 24% were young firms. The stronger engagement with digital technologies in younger firms is very welcome, but with some concerns here over lower reported levels of engagement in older more established firms.

Figure 4-14 Use of digital technologies by SME age (%)



More advanced users of digital technologies experience higher performance in terms of labour productivity growth. Figure 4-15 provides some initial evidence on a linkage between labour productivity growth and the use of digital technologies. Once again there is an expectation of strong sectoral and structural effects working here. Figure 4-15 reveals that among the high digital technology user group over two-thirds had seen positive year on year growth in labour productivity. On the other hand, the proportion of SMEs with negative growth in sales per employee is higher among low users (46%), compared with high users (22%).

Figure 4-15 Growth of sales per employee (latest financial year) by use of digital technologies (%)



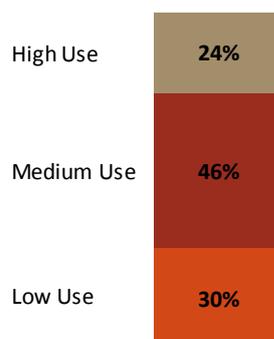
4.6 Use of e-commerce

Use of e-commerce is defined as the degree to which SMEs exploit the opportunity to engage in online transactions with customers and suppliers.

This is a composite measure based on SME respondents' answers to three questions: 1) the proportion of sales made online; 2) the proportion of purchases made online; 3) SME use of website, website analytics, and website live support.

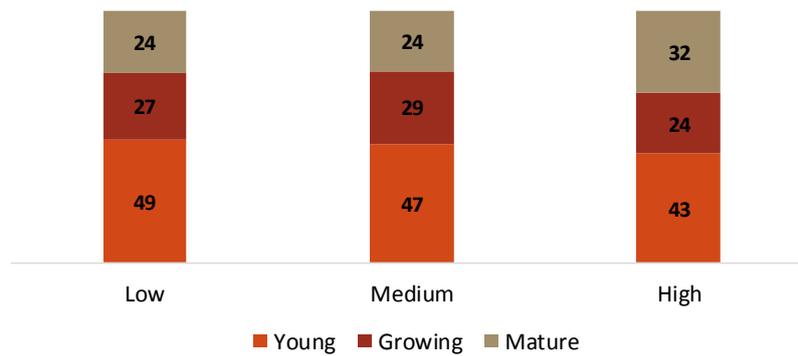
Figure 4-16 indicates that 30% of sampled SMEs are low users of e-commerce, 46% are medium users, and 24% are high users.

Figure 4-16 Use of e-commerce (% of SMEs)



SMEs are more comfortable using e-commerce than digital technologies. Mature SMEs represent 32% of high users of e-commerce (Figure 4-17), compared to only 13% of mature SMEs with high use of digital technologies (Figure 4-14). These results indicate that although high use of digital technologies is more prevalent among young SMEs, SMEs of all ages are comfortable exploiting broadband enabled opportunities by engaging in e-commerce. This suggests that SMEs, particularly established and mature, might be using digital technologies to a lesser extent due to a lack of capability or inertia caused by the vast number of available technologies and their associated complexity, calling for increased training and support for SMEs.

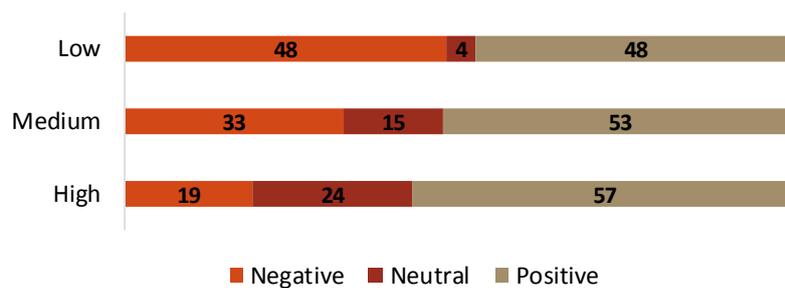
Figure 4-17 Use of e-commerce by SME age (%)



Increased use of e-commerce is reflected in SMEs’ enhanced sales per employee growth.

Figure 4-18 shows some linkage between e-commerce use and labour productivity, with 57% of high e-commerce use SMEs having a positive growth in sales per employee, compared to only 48% for the low user group. Nearly half (48%) of low e-commerce users had negative growth.

Figure 4-18 Growth of sales per employee (latest financial year) by use of e-commerce (%)



5 The digital dashboard for Wales

5.1 Introduction

The preceding sections have provided some initial results from the first *Digital Maturity Survey*. Whilst noting the important caveats relating to the sample size issues for this first survey, the results, where possible, have given an indication of how the findings vary by sector and geography.

The aim of the *Digital Dashboard for Wales*, is to draw out some of the results already discussed, that collectively represent a snapshot overview of digital maturity for the sample of respondents, which could usefully be monitored over time, whilst also providing some summary information from other (secondary) sources as contextual indicators.

This is a first attempt to compile a *Digital Dashboard for Wales*, hence it is necessarily exploratory, and will certainly evolve over time, as new information becomes available and new technologies develop.

5.2 Dashboard

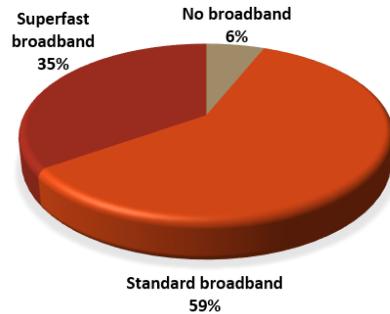
The digital maturity framework discussed in the opening sections of this report has provided the structure for the analysis of the survey results, and this structure is used once again in the *Digital Dashboard*.

The first (left hand side) component in Figure 5-1 describes levels of adoption for the sample SMEs, and summary data from Ofcom to provide an overview of the percentage of premises in Wales (household and business) which are able to receive superfast broadband.

Figure 5-1 Digital dashboard 2016

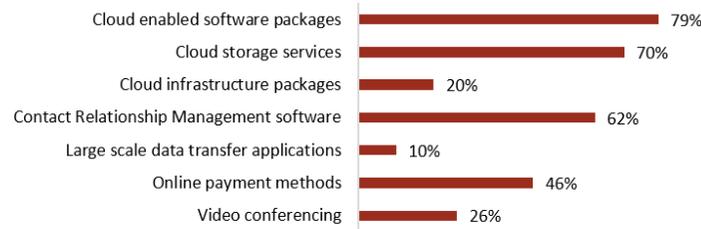
ADOPTION

Broadband adoption
Digital maturity survey 2016,
% of SMEs



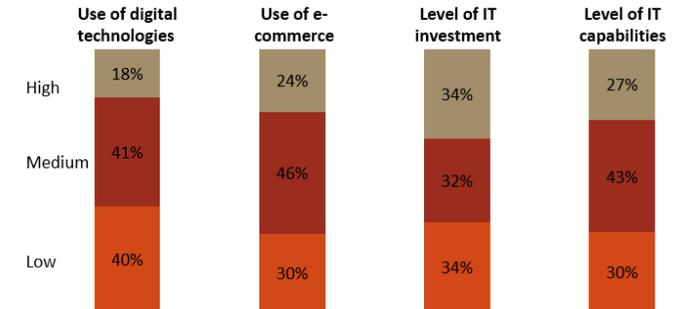
RESOURCES

Use of digital technologies
Digital maturity survey 2016,
% of SMEs



EXPLOITATION

Digital maturity assessment
Digital maturity survey 2016,
% of SMEs



SMEs able to receive superfast broadband in Wales
Ofcom 2016,
% of SMEs



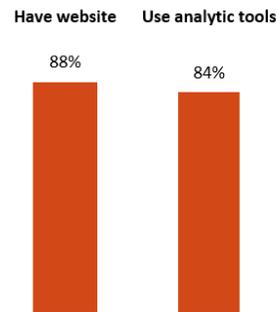
IT costs

Digital maturity survey 2016,
£ per employee

Spending category	Annual expenditure
Hardware	£684
Software	£662
Network	£180
Broadband subscription	£113

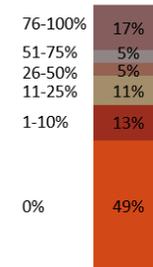
Use of websites and analytic tools

Digital maturity survey 2016,
% of SMEs



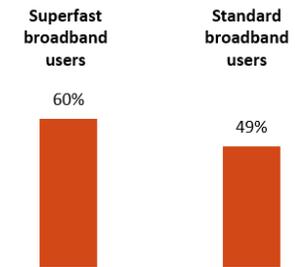
Share of e-sales in total sales

Digital maturity survey 2016,
% of SMEs



Performance of SMEs by type of broadband used

Digital maturity survey 2016,
% in group with positive sales per employee growth



The central section provides indicators relating to resources, defined in terms of IT investment and capabilities. Indicators range from those capturing relatively 'basic' activity, which is the percentage of SMEs with a website, and using analytic tools, to those measuring more 'advanced' use of selected digital technologies, and the significance of e-sales in relation to total business sales. Also in this section are IT costs (per employee), comprising hardware, software and network costs, as well as broadband subscription.

The right hand side section describes broadband exploitation, and gives an overall assessment of digital maturity, using four defined measures. The data for this graphic has been derived by combining information from several survey questions, which has then been sorted into low, medium and high categories. Details on the derivation and ranges for these indicators were explained in Section 4.

Interestingly, some further analysis of this data shows that SMEs with superfast broadband are in all the categories in this figure. Along with the other information in this *Digital Dashboard*, this suggests that a number of SMEs have superfast broadband and have high use of digital technologies, high IT capabilities etc. However, other SMEs with superfast broadband are in the low and medium categories in this figure, and are therefore not fully using available digital technologies.

The final figure on the Dashboard provides a comparative analysis of SME performance, measured here by sales per employee growth, by type of broadband. This figure shows that the proportion of SMEs with positive sales growth was higher amongst the superfast broadband users compared to those with standard broadband. The issue of SME performance is critical, but also highly complex. Whilst this result is consistent with the digital maturity framework, linking adoption of superfast broadband to investment and exploitation and then SME performance, there are a range of other factors, outside of this framework that impact on SME performance. Future surveys and case studies will be used to further explore these linkages, and in time will provide more robust evidence and estimates of impact.

5.3 Future developments

The most obvious purpose of future *Digital Dashboards* will be monitoring the development and change in digital maturity over time. The selected indicators will be identified in future survey returns and compared with earlier periods to present a more dynamic picture of the digital maturity of SMEs in Wales. Other anticipated developments include the addition of further contextual and comparative data that may enable some benchmarking of Wales, compared to the UK/EU for selected indicators. This development comes with a number of challenges, including the comparability of the sample and the definition of key variables, and this work is ongoing.

6 Conclusions

This is the first of a series of annual digital maturity reports that will be published between 2016 and 2020. By way of conclusions, the following points can be made:

- With respect to the initial findings of the first *Digital Dashboard* and *Digital Maturity Survey* analysis it is clear that SMEs in Wales differ in their access to the superfast broadband resource, and as expected with differences in spatial coverage throughout the regional economy.
- It is also equally evident that even in parts of Wales where there is better quality access to the superfast broadband resource, that SMEs vary in their ability to use this resource, and pay very different amounts to access the resource. Even where SMEs reported access and use of the resource, the productivity and process outcomes differed. While these types of issues have been described in the report, much more research needs to be done to drill down into these findings to develop policy relevant outcomes.
- Then it is important to recognise that this report has focused largely on description around the Survey findings and with some limited analysis in Section 4 of the report. However, the findings here will feed into the economic impact assessment report which will be developed in the first quarter of 2017. Then alongside the development of the current report has been work to develop case studies of SMEs to assess in more detail their use of the new technology, how this translates into innovation in terms of products and processes, which may then find its way through to improved business productivity and performance. This more detailed case work, and economic impact analysis, is essential in identifying how access to superfast broadband resources can contribute to economy-wide outcomes, and the types of intervention that have the strongest effects on SME performance.
- Both the survey approach and methodology used to inform the development of the *Digital Maturity Survey* will evolve over the duration of the project. As was revealed earlier in the report, there is work to do in improving the number of responses from SMEs in Wales. Gaining higher numbers of quality and representative responses will be a learning exercise and it is expected that in the second iteration of the *Digital Maturity Survey* (fieldwork beginning later in 2017) that the number of questions will be refined, and the means through which SMEs are targeted will be improved. To some extent the first iteration of the *Digital Maturity Survey* has provided information on parts of the survey that worked well and less well, and the analysis of the findings represents the first stage of a refinement of the Survey resources that will be used in the future.

- One corollary of the above point is that some care is required in using, and then generalising from the findings in the first *Digital Maturity Survey*. Of particular concern is the low level of responses from some sectors of the regional economy. The research planned during the coming year will seek to address this issue.
- Notwithstanding the first survey provides some interesting results, and does provide signals of where there are issues in terms of access, but also is revealing the SME gains of engaging efficiently with the range of services that become available with superfast broadband. These signals are critical. A context for the research and the wider Welsh Government superfast business support project is that business productivity in Wales is far lower than that in competing regions of the UK and wider European Union, and with this one of the main explanations of the gross value added per capita gap between Wales and adjacent parts of the UK. Transport and education infrastructure impacts business productivity but so can access to the services offered on superfast broadband platforms. The economic impact analysis that follows from this report will seek to better quantify these types of connections, using the survey findings to help develop estimates of the all-Wales outcomes levered by superfast broadband.

Annex

Survey methodology

The survey questionnaire included both closed' and open-ended questions, with an estimated completion time of 15-30 minutes. It was designed to be completed by a senior owner or manager of a business, with a focus of eliciting different aspects of the business' activities, the role of superfast broadband, and enabled digital technologies in its different functions and activities of the business, and benefits gained.

The survey was disseminated to businesses across Wales electronically, with the aid of research partners such as all 22 Local Authorities across Wales, Business Wales, Federation of Small Businesses (FSB) Wales, The Electronic and Software Technologies Network for Wales (ESTnet), Construction Excellence Wales (CEW), and National Farmers Union (NFU) Cymru. Partners used a range of strategies to disseminate the survey including direct email invites and reminders (three weeks after the initial invite), newsletter content, and social media awareness raising (Facebook and Twitter principally). It was available for completion electronically (Bristol Online Surveys) or via hard copy, in either English or Welsh language.

Additional direct promotion of the survey was undertaken by the Cardiff Business School team. This included attendance and short presentations at a range of Welsh Government Superfast Broadband business support events throughout Wales (11 in September 2016), and networking at Business Events (Flintshire Business Week, VentureFest Wales, Physical Web Wales Co-innovation Event).

All business sectors in Wales were invited to take part in the survey, with the intention of building economy-wide evidence for all sectors and geographies (where response rates permitted). The survey was open for a period of just over two months (1st September to 6th November 2016), with dissemination through email invitations, and social media awareness raising. In addition, the Cardiff Business School researchers attended business events in September 2016 to collect responses from businesses. Consequently, the survey sample includes both unassisted and assisted businesses.

Overview of the sample

A total of 166 usable questionnaire responses were achieved at close of survey in November 2016. Table A-1 below provides an overview of the responses achieved, according to sector (ONS high level sectors) and broad geography area of Wales.

Table A-1. Sector

	Count	%
A: Agriculture, forestry & fishing	3	1.8
C: Manufacturing	13	7.8
F: Construction	3	1.8
G: Wholesale & retail trade; repair of motor vehicles	19	11.4
H: Transport & storage	2	1.2
I: Accommodation & food service activities	27	16.3
J: Information & communication	26	15.7
K: Financial & insurance activities	7	4.2
L: Real estate activities	1	0.6
M: Professional, scientific & technical activities	33	19.9
N: Administrative & support service activities	4	2.4
O: Public administration & defence; compulsory social security	2	1.2
Q: Human health & social work activities	3	1.8
R: Arts, entertainment & recreation	12	7.2
S: Other service activities	11	6.6
Grand Total	166	100.0

This table highlights strong response rates from key service sector activities such as Professional, scientific and technical activities (19.9%), Information and communication (15.7%), Accommodation and food service activities (16.3%) and Wholesale and retail trade; repair of motor vehicles (11.4%). These sectors reflect the disposition of some sectors to make use of digital technologies and ICT.

Table A-2. Location, by local authority area

	Count	%
Anglesey	5	3.0
Blaenau Gwent	1	0.6
Bridgend	4	2.4
Caerphilly	10	6.0
Cardiff	22	13.3
Carmarthenshire	4	2.4
Ceredigion	12	7.2
Conwy	5	3.0
Denbighshire	2	1.2
Flintshire	5	3.0
Gwynedd	19	11.4
Merthyr	5	3.0
Monmouthshire	6	3.6
Neath Port Talbot	7	4.2
Newport	3	1.8
Pembrokeshire	7	4.2

Powys	19	11.4
RCT	10	6.0
Swansea	3	1.8
Torfaen	5	3.0
Vale of Glamorgan	3	1.8
Wrexham	9	5.4
Grand Total	166	100.0

Survey responses were achieved from all local authority areas in Wales, with the highest proportion from the Cardiff local authority area (13.3%). Other local authority areas accounting for more than 10% of responses include Gwynedd (11.4%), Powys (11.4%). Comparatively fewer responses were achieved in the South West local authority areas (e.g. Carmarthenshire and Pembrokeshire).

Table A-3. Employee size

Q10. Employee size		
	Count of ID	%
Micro (0 to 9 emps)	123	79.4
Small (10 to 49 emps)	21	13.5
Medium (50 to 249 emps)	11	7.1
	155	100.0
(blank)	11	

The survey response largely reflects the structure of the Welsh economy, with SMEs (by employees sizes) accounting for all responses. Within this almost 80% of responses were from Micro companies.

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