



Regional
Development
Australia

NORTHERN TERRITORY

TECHNICAL REPORT 2016

Meeting the Challenges of a Digital Economy

*Digital Workplaces in Outer Regional, Remote and
Very Remote areas of Australia: experiences from the NT.*

“Our Satellite service is well below a standard where we can use cloud services. We are expected to move to digital record keeping, yet our internet connection means this is borderline impossible due to slow speeds.”

– Very remote user, Tiwi Islands

“Virtual based admin reduces costs by 50%”

- Remote user, Wagait Beach

“[We are] starting to use Skype more often when interviewing.”

– Remote user, Alice Springs

“ALL of our application needs are in the Cloud.”

– Outer regional user, Nightcliff

“Video Conferencing is too expensive.”

– Remote user, Katherine

“Staff need ongoing training to use technology.”

– Remote user, Alice Springs

“We are innovative and open to new ideas and creative ways that include other organisations, partnerships and collaborations.”

– Very Remote user, Ali Curung

“We are a location based, site specific experience with limited opportunities to increase technological assistance in daily operations.”

– Remote user, Alice Springs



An Australian Government Initiative



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Acknowledgements

This project began in 2013 when Regional Development Australia Northern Territory (RDANT) began a project to facilitate digital capacity building across the region. The Digital Workplace Assessment Tool (DWAT) was part of this larger project. Digital Project Officer, Ian Burton, had initial carriage of the DWAT, including development, pilot testing and refinement of the Survey and some preliminary analysis in 2014. Central Australian Project Officer, Robin Gregory was responsible for the research review, final analyses of DWAT Survey results and preparation of this report during 2015. For discussion and review of the initial draft report thanks must go to Kate Peake. However our biggest thanks must go to all the participants in the DWAT Survey.

Introduction

“In one sense, the Internet is like the discovery of the printing press, only it's very different. The printing press gave us access to recorded knowledge. The Internet gives us access, not just to knowledge, but to the intelligence contained in people's crania, access to the intelligence of people on a global basis.” – Don Tapscott

Just as the printing press changed European economic geography, the Internet is re-shaping economies and industries around the world. This transformation process cannot be avoided, nor delayed. By the 16th Century European cities who had established printing presses in the previous century, grew 60% faster than otherwise similar cities.¹ In 2011 it was estimated that digitisation contributed US\$193B to the global economic output and created six million jobs around the world.² In 2010 in Australia the Internet directly contributed \$50B to the economy, or 3.6% of the Gross Domestic Product (GDP), equal to the Australian retail sector or iron ore exports at that time.³ In March 2015, Deloitte revised their value of Australia's digital economy upwards to \$79B and 5.1% of GDP.⁴

For businesses, the benefits of participating in a digital economy include improved productivity and performance; access to new markets; providing new or improved goods and services; increasing the value add for existing goods and services; new organisational structures; greater integration with supply chains; and monitoring and responding to the activities of competitors.⁵ Other benefits may include reducing transaction costs and greater collaboration amongst people in different locations.⁶ The impetus to be digitally connected is also driven by assumptions and expectations of consumers.

However, the benefits of the Internet are not limited to the business sector. Governments also use the Internet to deliver services, which reduces costs, (potentially) increases customer satisfaction and encourages innovation.⁷ Education and health in particular have been identified as two areas in which the Internet can provide significant benefits, particularly regarding service delivery in regional and remote areas.⁸ Not-for-profit (NFP) organisations identify benefits such as the ability to expand their pool of supporters and access to more innovative fund raising models.⁹

Despite these well-documented potential benefits of Information and Communication Technology (ICT) adoption and usage, research in Australia and overseas indicates that there are still significant barriers to digital transformation. Such barriers include negative attitudes towards the Internet, internal organisational issues, poor digital literacy and perception of risks associated with change.¹⁰ Technological issues (infrastructure), lack of access to trusted IT advice and support, costs (affordability) and lack of time have also been identified as barriers to high levels of Internet use.¹¹

In the same year that the (former) Department of Broadband and Communications (DBC) wrote of its high expectations for Australian digital participation, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) noted that in contrast to households, Australian businesses did not appear to be embracing the Internet¹². The World Economic Forum also noted that Australia lagged behind many other developed countries in terms of “networked readiness” measured in terms of political and regulatory environment; government and business innovation; infrastructure and digital context; affordability; skills; individual, business and government usage; economic impact; and social

impact.¹³ The World Economic Forum highlighted the relationship between investing in ICT, skills development and innovation, and economic success. They suggested that failure to invest sufficiently in ICT would result in Australia being left on the wrong side of the readiness threshold.¹⁴

In 2014, Australia fell further behind in the global rankings for average and peak connection speeds, high broadband connectivity (>10mbps) and 4K video (Ultra HD) readiness.¹⁵ Falls in Australia's global rankings were attributed to affordability as well as the Government's decision to switch the National Broadband Network (NBN) from fibre-to-the-premises to a mixed fibre/copper network.

Nonetheless, embedded in an increasing number of Australian government policies is the assumption that we are all digital-ready. The Australian Government's 'Digital Transformation Agenda' specifies that all non-corporate Commonwealth agencies with high volume transaction services (50,000+ transactions p.a.) and digital information services must prepare a Digital Transformation Plan to guide the shift of these services to an online environment.¹⁶ Likewise, implicit in the Government's proposal to develop Northern Australia¹⁷ is an assumption that telecommunications will enable future growth and participation in a global digital economy.¹ In 2013 the DBC wrote that:

"By 2020, Australia will rank in the top five OECD countries in terms of the proportion of businesses and NFPs using online opportunities to drive productivity improvements, expand their customer bases and enable jobs growth."¹⁸

While the Commonwealth and some state and local governments have developed digital strategies,¹⁹ to date there is no specific digital strategy for the Northern Territory (NT) available in the public arena. In order to develop the appropriate strategies, policies and programs to maximise the opportunities of a digital economy, a clear understanding of the digital capacity and capability of organisations throughout the Territory is essential.

Whilst some nationwide studies of Internet adoption and usage have included the NT, these have not produced longitudinal and spatial trends nor facilitated an in-depth consideration of drivers and barriers specific to the NT. Additionally, such studies have primarily focused on the business sector in metropolitan areas. Given that the vast majority of the NT consists of Remote and Very Remote areas, these studies are limited in their applicability. As a result there are significant gaps in our knowledge and understanding of digital capacity and capability in the NT. The Digital Workplace Assessment Tool (DWAT) Survey aims to address this knowledge gap.

Report structure

The DWAT Survey is unique in its focus on ICT and Internet use in workplaces in Outer Regional, Remote and Very Remote areas of the NT. In this report, Survey findings are presented in the context of government policy and research from Australia and overseas, as well as the geographic realities, connectivity issues, and social and economic profiles unique to each area. The report provides new perspectives and insights into Internet use in areas of the NT beyond Darwin. It has the potential to inform policy and assist in increasing participation in the global digital economy for these often disadvantaged communities.

¹ Implicit because the word "digital" does not appear anywhere in the Commonwealth of Australia 2015, *Our North, Our Future: White Paper on Developing Northern Australia*. Nor does it appear in the NT Government's *Northern Territory Economic Development Strategy*.

The DWAT Survey Report is structured in three parts as follows:

Part 1 (Chapters 1 – 3) describes the setting for the study at both the local and national levels. Chapter 1 briefly describes the key geographic and socio-economic features of the NT. It also defines the Remoteness categories used in this survey and the geographic, Internet connectivity, social and economic characteristics of each area. Chapter 2 discusses the concept of digital transformation and adaptive strategies in general. It also provides a background for understanding the drivers and barriers to participation in the digital economy by Territory organisations, including the Federal and NT Government policy environments. Chapter 3 considers the extent to which Australian small businesses and NFPs have already adapted to a digital environment. It includes statistical information about Internet use, connectivity and ICT management based on a review of research conducted in Australia over the last five years. It also includes a discussion of barriers and drivers for greater ICT use.

Part 2 (Chapters 4 – 9) describes the DWAT survey and results. Chapter 4 provides an introduction to the DWAT Survey and participant profile. Chapter 5 builds on this profile with the type and nature of connectivity available to organisations (government, business and NFP/community) in Outer Regional, Remote and Very Remote areas of the Territory. Chapter 6 explores Internet usage data, cost reduction strategies and online business innovation, providing new insight into the digital capacity and capability of organisations. Chapter 7 provides insight into the internal ability of organisations to manage the digital aspects of their businesses, including having policies and procedures in place for staff working online, compliance with legislation and data standards, and cyber-security.

Chapter 8 examines the level of strategic engagement by business in the digital economy, including identifying new markets, services and products and actively developing new services online. Chapter 9 investigates the extent to which attitudes, cost, potential for teleworking, digital literacy and connectivity impact on Internet use.

Part 3 (Chapters 10 – 12) summarises and discusses the results of the survey. Chapters 10 and 11 consider the DWAT data through the lens of remoteness and workplace type respectively. These findings confirm some assumptions made about Internet use in remote areas, and challenge others. Finally, Chapter 12 provides a discussion of the DWAT Survey findings. It suggests a new framework for increasing participation in the digital economy for organisations across the Territory.

Part I

“In a global economy and digitally connected world, the development and provision of affordable, fast and reliable digital technologies is particularly important in regions where distance and access are real challenges. New digital technologies are vital for the growth of businesses and jobs, essential for the expansion of educational opportunities. They will enable research and development, and provide the capacity to improve health care in regional and remote communities. The digital revolution has the capacity to end the tyranny of distance, but only if effective investment in communications infrastructure and digital services is made by governments, industries and communities.”

-Joint Select Committee on Northern Australia²⁰

1. NT overview

The NT comprises one-sixth of Australia's landmass and is characterised by its relatively young population and high proportion of people who identify as being of Indigenous descent. Beyond the Darwin-Palmerston area, the population tends to be sparsely distributed across the landscape with smaller concentrations of people in service centres such as Katherine, Tennant Creek, Alice Springs and Nhulunbuy. The top half of the NT is known as the Top End. It sits in the dry tropics and is characterised by strongly seasonal Wet and Dry periods. In contrast, the southern half of the NT lies in the arid zone, with highly variable, patchy rainfall, long hot summers and short dry winters.

Although the NT has one of Australia's strongest economies, activity has predominantly been driven by large oil and gas projects, such as the Ichthys gas project (Inpex), which offset a downturn in tourism and a lack of growth in primary industries.²¹ The NT economy is also characterised by a relatively large public sector and substantial Defence presence. It was not until recently that the NT Government re-focused economic development back on the tourism, agribusiness, international education and training, supply and service sectors.²²

Despite this substantial potential for economic prosperity, the NT continues to experience high rates of socio-economic disadvantage, particularly outside of the major urban areas. Excluding the Darwin-Palmerston, Alice Springs and Katherine regions, much of the NT falls into the first decile (most disadvantaged) on the Socio-economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage.

The type of Internet connectivity and level of coverage found across the NT is pertinent to this study. Fixed infrastructure with connection to premises (e.g. ADSL, FTTP and FTTN) is typically used in urban and regional centres. Remote area users are more likely to rely on fixed wireless and satellite for broadband.²³ In 2014 the Australian Infrastructure Audit found that the Territory had "the lowest coverage of the states and territories for fixed and mobile broadband services" and that "remote communities in the NT lack contemporary communications infrastructure."²⁴ More specifically, 41% of these communities lacked access to traditional fixed-line telephone services, 91% lacked access to digital subscriber line (DSL), and 52% lacked access to mobile networks as of June 2014. Overall, there were 44 remote communities that did not have access to even basic fixed and mobile services at that time.²⁵

1.1 Definition of 'remote'

While the word 'remote' is commonly used to refer to parts of the country outside of the major service centres, this report uses the terms Outer Regional, Remote and Very Remote to refer to specific geographic areas as defined by ABS Remoteness Structure.

The purpose of the ABS Remoteness Structure is to allow identification of areas of Australia that share common characteristics of remoteness. As shown in Figure 1.1 most of the NT is categorised as Very Remote under the ABS Remoteness Structure and there are no Inner regional areas or Major capital cities. In this structure remoteness is based on ARIA+, a measure of road distance to the nearest service centre that is categorised based on population size. Thus this remoteness measure is independent of any socio-economic factors.²⁶

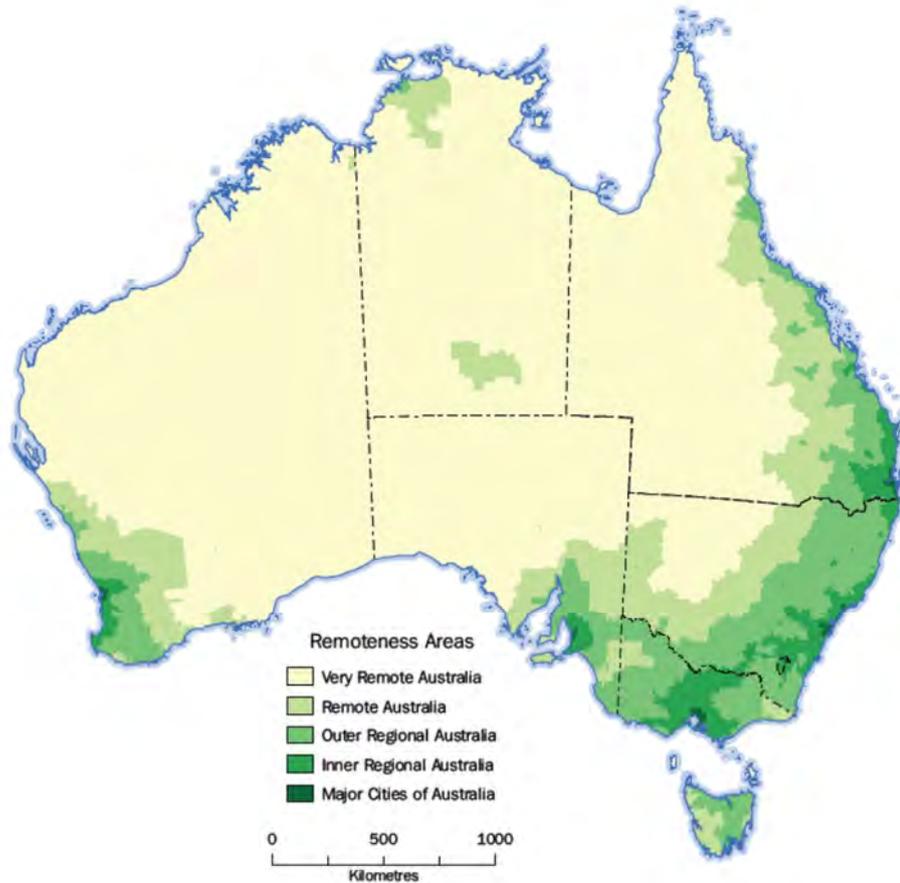


Figure 1.1. Remoteness areas across Australia

Source: ABS, 2011. *Australian Statistical Geography Standard: Remoteness Structure*

1.2 Outer Regional NT

Outer Regional NT covers 3163.9 square kilometres and is essentially limited to the Darwin-Palmerston area. Most of the Territory's population (56.9%) resides in this area and it is the administrative centre of the NT. Indigenous people comprise 9.2% of the NT Outer Regional population and, based on 2011 Census data, the area is also characterised by a high degree of multiculturalism with 27.1% of people born overseas and 14.7% speaking a language other than English or an Australian Indigenous language at home.²⁷ At the time of the last Census, just under 16% of dwellings did not have an Internet connection. Of those that had an Internet connection, 88.3% used broadband, 4% relied on dial-up and the remainder used "other".²⁸

In terms of education, 35.1% of the Outer Regional population completed Year 12 or equivalent while 0.5% did not go to school. Private sector employment accounted for just over 36% of employment in the NT Outer Regional area compared to 15.7% for the public sector. The NT Government is the largest government employer and the median total personal weekly income is \$897 and median total household weekly income is \$1806.²⁹ The largest industry (by number employed) in the Outer Regional area is Public Administration and Safety (11.3%) followed by Health Care and Social Assistance (4.8%), Construction (4.8%), Retail Trade (4.5%) and Education and Training (4.1%).³⁰

Until recently, discussion of regional development issues was hindered by a lack of comparative data about regional Australia. To overcome this, in mid 2013 the Regional Australia Institute developed the Regional Competitiveness Index, which provides a framework for understanding a particular region's competitiveness, based on measures such as the capacity to innovate, promote entrepreneurship, retain and attract people, and improve living standards.³¹ According to research and analyses by the Regional Australia Institute, the Outer Regional area of the NT is considered highly competitive.³²

1.3 Remote NT

Areas of the NT classified as Remote under the ABS Remoteness Structure collectively cover 95,314.3 square kilometres and include the towns of Katherine, Alice Springs and surrounding hinterlands, as well as the hinterlands of the Darwin-Palmerston Outer Regional area. Remote areas are in relatively close proximity to service centres that provide a range of retail, health, education, social assistance and other services not available locally.

Just over 20% of the Territory's population resides in Remote areas. Of these, 26.7% are Indigenous, about 15.7% of people were born overseas and 7.5% speak a language at home other than English or an Australian Indigenous language.³³ Almost 23% of dwellings in Remote areas did not have an Internet connection in 2011. Of those that did, 87.5% used broadband, 4% relied on dial-up and the remainder used other.³⁴

Regarding education, 29.2% of the Remote population completed Year 12 or equivalent but the proportion who did not attend school (1%) is double that of Outer Regional areas.³⁵ In Remote areas of the NT the private sector employs 33.2% of people whilst government employs just under 14%. The NT Government is the largest government employer. Public Administration and Safety is the largest industry (by number employed) in Remote areas (8.8%), followed by Health (6.5%), Education (4.8%), Retail Trade (4%) and Construction (3.4%). The median total personal weekly income is \$768, less than in Outer Regional areas and the median total personal weekly income is also lower, being \$1527.³⁶

Based on the Regional Competitiveness Index, while Alice Springs is considered 'competitive', Katherine is considered to be amongst the least competitive.³⁷ However, comparative strengths and weaknesses can be seen in Table 1.1, which shows the rankings by competitive theme for these two Local Government Areas (LGAs).

Table 1.1. Rankings by competitive theme for the Alice Springs and Katherine LGAs. Rankings are out of 563 LGAs, with 1 the highest and 563 the lowest.

Data source: [In]Sight Australia's Regional Competitiveness Index interactive tool

Theme	Alice Springs	Katherine
Foundational institutions	137	280
Technological readiness	125	449
Infrastructure and Essential services	440	491
Business sophistication	209	308
Economic fundamentals	319	305
Innovation	191	377
Human capital	232	459
Labour market efficiency	65	253
Demography	195	251
Natural Resources	563	545

1.4 Very Remote NT

The majority of the NT, over 1.2 million square kilometres, consists of Very Remote areas including Arnhem Land, towns such as Elliott and Boorooloolo, the Victoria-Daly, Roper Gulf, Barkly and Central Desert LGAs, most of MacDonnell LGA, the Tiwi Islands, and islands along the northern coast and Gulf of Carpentaria. These areas lack access to major service centres. The population is sparsely distributed across pastoral stations, mining sites, Indigenous Protected Areas, other Reserves and National Parks.

Just under 22% of the Territory's population lives in Very Remote areas of the NT and of these, 77.6% are Indigenous. Only 3.9% of people in Very Remote areas were born overseas and only 2.3% speak a language at home other than English or an Australian Indigenous language.³⁸ In 2011, almost half (49.1%) of all dwellings in Very Remote areas of the NT did not have an Internet connection. Of those that did, 80.9% used broadband, 4.5% dial-up and the rest other.³⁹

While 15.8% of residents completed Year 12 or equivalent, the proportion that did not go to school (2.9%) is more than three times that of Outer Regional areas and more than double those in Remote areas.⁴⁰ In contrast to Outer Regional and Remote areas where the private sector accounts for over 30% of employment, there is only 19% private sector employment in Very Remote areas, including the mining sector which accounts for 1.5% employment (compared to 1.1% in Outer Regional and 1.3% employment in Remote areas). Government agencies account for 10.3% employment in Very Remote areas. Unlike Outer Regional and Remote areas where the NT Government is the largest government employer, local government is the largest government employer, responsible for delivering a wide range of non-core services in addition to those services traditionally provided by this tier of government.ⁱⁱ Outside of the public and health sectors, Land Councils comprise one the larger and more sustainable workplaces in Very Remote areas.

In Very Remote areas, median total personal weekly income (\$297) is substantially lower than in Remote or Outer Regional areas, as is median total household weekly income (\$1350).⁴¹ As in Outer Regional and Remote areas, Public Administration and Safety is the largest industry (by number employed) (6.8%), followed by Education (3.8%), Other Services (3.2%), Health (2.6%) and Agriculture, Forestry and Fishing (1.8%).⁴²

As may be expected, Very Remote areas of the NT are among the least competitive in Australia according to the Regional Competitiveness Index.⁴³ Very Remote NT ranked poorly in terms of infrastructure, essential services and technological readiness although there were variations across LGAs (Figure 1.2). For example, while the Tiwi Islands LGA ranked highest for Infrastructure and Essential Services it was the least "technologically ready" whereas West Arnhem ranked highest for Technological Readiness.

ⁱⁱ An important exception is planning. Local government in the NT does not give planning approvals under the *NT Planning Act*.

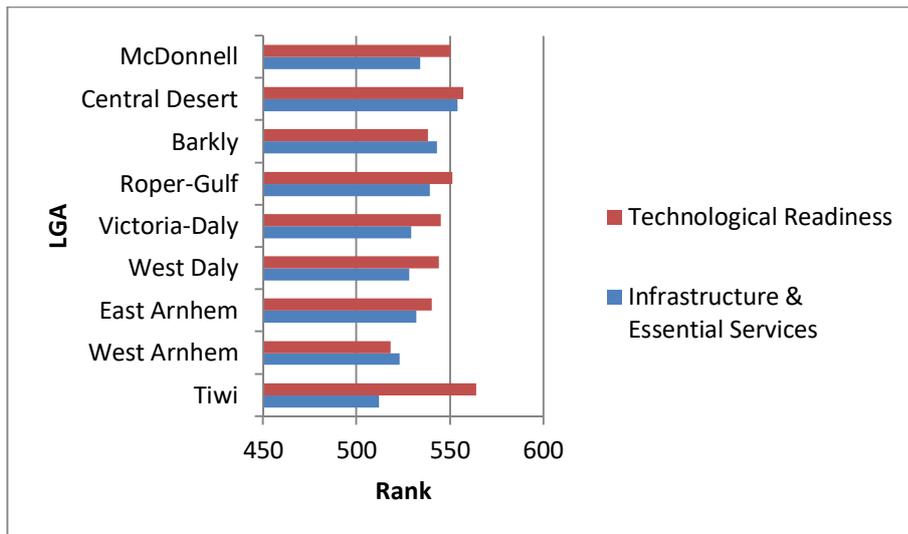


Figure 1.2. Rankings by the technological readiness and infrastructure and essential services themes for LGAs in Very Remote NT. Rankings are out of 563 LGAs with 563 the lowest.

Data source: [In]Sight Australia’s Regional Competitiveness Index interactive tool.

The combination of the harsh physical environment, geographic and socio-economic features of Outer Regional, Remote and Very remote areas of the NT pose challenges for regional development. The vast distances between settlements, small populations and smaller dispersed industries (apart from mining) make it difficult to achieve economies of scale. Lack of essential services and limited, poorly maintained infrastructure, are two key constraints for regional development.⁴⁴ There is a strong view that some of these disadvantages can be overcome by access to telecommunications, especially the Internet and participation in knowledge/digital economies.⁴⁵

The impact of the digital economy upon business and their readiness to respond varies across industries, as well as according to business size and other factors. The next chapter examines industry transformation as well as how the Australian Government and NT Government have responded to the global digital agenda, and how policies and programs are impacting on the potential for digital transformation in regional and remote areas of the NT.

2. Digital transformation

This section considers the timing and consequences of transformation both overseas and in Australia. It identifies factors that determine the extent to which different industries will be transformed by the digital economy and identifies those industries most likely to be affected, with a view to considering how Territory workplaces might be impacted. The adaptive capacity and “readiness” of enterprises and strategies that might be required in order to maximise potential opportunities are also identified.

2.1 Industry transformation

In this report, we have replaced the word “disruption”, used by some analysts to describe the economic impact of ICT,⁴⁶ with “transformation”. We believe that the term disruption frames discussion in terms of problems and risks, potentially overshadowing the opportunities and benefits of change. It is easier to encourage organisations to embrace digital “transformation”, which infers a significant change in technology use, business model, products and/or markets.

In 2013, IBM and the National Institute of Economic and Industry Research (NIEIR) examined transformation and what it meant for individual enterprises across seven different sectors most likely to be impacted by a transition to a digital economy. Their research suggested that within the next 10 years a significant gap will emerge between organisations that have proactively transformed their businesses to a “more sophisticated customer and supply chain integration and superior productivity”⁴⁷ and those that have continued with a ‘business as usual’ approach. Businesses that don’t transform will find it increasingly difficult to regain their market position once lost and are likely to fail altogether. Some evidence of this has already occurred in highly exposed industries such as music and media, as well as photographic services; witness the demise of well-known companies such as Kodak. IBM-NIEIR predicted that by 2018 nearly all sectors would have been substantially reshaped by the digital economy.⁴⁸ Transformation processes already in progress include:

- Heavy dependence on digital technology;
- Close connectivity with and between customers e.g. through social media;
- New demands by customers and employers e.g. online shopping, work from home;
- Organisations are becoming flatter and more agile as information flows, automation and speed increases;
- Impact of big data gathering on decision-making; and
- Sources of competition are increasing as digital technologies facilitate participation in national and international markets.⁴⁹

In their paper *Compete to Prosper: Improving Australia’s global competitiveness*, McKinsey observed that the global uptake of “disruptive” technologies combined with falling transportation costs has resulted in the fragmentation of once traditional supply chains.⁵⁰ Competition is shifting from a particular industry or region to a particular segment of the value chain such as logistics or design. It is flowing through to employment as file sharing and collaboration tools allow workers to be based anywhere in the world and an increasing number of tasks are automated.⁵¹

In 2013, an Oxford Economics international study of small-medium enterprises (SMEs)ⁱⁱⁱ found that one third of businesses generated at least 20% of their revenue internationally. The study estimated that in three years the number of small firms that did business in six or more countries would increase from 15% to 35%.⁵² For the Australian firms that participated in this study, this was expected to increase from 6% to 30%. Additionally, 43% of Australian SMEs expected to generate between 21% and 43% of their revenue globally in three years, a 54% growth rate expected to surpass the global average of 36%.⁵³

As early as 2010 a study in the UK found that the Internet has proved to be a mixed blessing for large, established companies. While they had legacy assets and investments that were not easily converted to digital technologies, they had the scale, capital and other resources to undertake changes.⁵⁴ In contrast, many SMEs “aggressively exploited” the Internet as a means to enable more effective competition with larger firms.⁵⁵ Transformational levers identified in the 2010 study included geographical expansion without the need for a physical presence; improved automation and information exchange across supply chains to increase efficiency and productivity; greater collaboration among and between customers, suppliers and partners; increased transparency and reduction in the ability of third parties such as middlemen and brokers to take advantage of information asymmetries; and profitable “long tail”^{iv} sales to small subsets of consumers.⁵⁶

Although not as detailed as the IBM-NIEIR study in terms of industry-specific impact, Deloitte’s 2012 study of transformation analysed 13 factors that will affect the timing and size of “digital disruption” across 18 industries.⁵⁷ These factors included:

- Extent to which goods/services are physically delivered;
- Propensity of customers to use digital channels;
- Importance of broadband and computing in the business operations;
- Mobility, and age, of the business’s customers and workforce;
- Significance of social media and cloud computing; and
- Government regulations or other factors that may hamper digital innovation.⁵⁸

McKinsey (2014) identified Finance, Retail, Telecommunications and Education as the sectors that are likely to be “profoundly reshaped” by the digital economy⁵⁹ and similarly, both IBM-NIEIR and Deloitte identified the Financial Services, Telecommunications and Information Media, Retail, Education and Health sectors as most likely to be impacted.⁶⁰ IBM-NIEIR also identified Mining and Public Administration among the sectors most likely to be impacted, but Deloitte’s analysis suggested that Mining would be among the least impacted. Instead Deloitte also identified Transport, Postal and Warehousing, and Professional, Scientific and Technical Services among those industries that will potentially see the greatest transformation.⁶¹

Deloitte took their analysis a step further and considered the likely timing and magnitude of impact among industry sectors according to a range of factors. When this approach was adopted they found that Telecommunications and Information Media, Finance, Professional Services, Real Estate,

ⁱⁱⁱ Oxford Economics defined SMEs as firms with less than 250 employees.

^{iv} Long tail (in retail and marketing) refers to the large number of products that sell in small quantities, as contrasted with the small number of best-selling products.

Retail Trade, and Arts and Recreation were the industries that will experience the largest magnitude of impact within the shortest timeframe. In contrast, Mining and Manufacturing are expected to experience a smaller impact over a much longer time period.⁶²

These studies suggest that transformation will significantly impact the Territory over the next few years. When the Deloitte findings are applied to the NT, as at June 2014 23.8% of all businesses in the NT will be affected.⁶³ If the sectors identified by both IBM-NIEIR and Deloitte are considered (Finance, Telecommunications, Retail, Education and Health), 19.4% of NT businesses will be impacted. Given the additional challenges posed by the NT's particular geography and demography, the impact of change in the Education and Health sectors may be even more profound.

IBIS World considered potential longer term impacts (i.e. in 2050) of the digital age on Australian business and society,⁶⁴ across a range of industries at the city, household, workplace and enterprise level, although it does not appear to have factored in the impact of climate change, which has already begun to interrupt Internet access.^v They predict that by 2050 stand-alone small businesses will be a thing of the past; instead franchises will be necessary to provide the economies of scale and IP needed to operate in an Infotronics Age. In contrast, medium enterprises with revenue between \$1M and \$100M will experience the fastest growth owing to a lower demand for capital, creation of new entrepreneurial opportunities, more flexible lending and increasing levels of outsourcing by households and businesses.⁶⁵ Many corporations will exist solely as virtual corporations and up to 25% of people could be working from home. By 2050 communications will have become a surrogate form of transport.⁶⁶

2.2 Potential adaptive strategies

According to IBM and NIEIR, organisations committed to participating in the digital economy should undertake the following steps in order to build their own transformation agenda:

- Establish their current position, both within their industry and market, and identify how they are positioned to compete in a digital age;
- Consider timing, i.e. how quickly can the organisation change and how quickly are/can competitors change?;
- Identify levers to drive change, e.g. customers, people and culture, costs, technology and assets, capital productivity, product and service innovation, stakeholder engagement;
- Set priorities; and
- Develop a transformation “story” in which the organisation’s current position, the need for change and future plans are told.⁶⁷

Similarly, Deloitte identified three broad potential strategies for managing digital transformation, including recalibrating cost structures, replenishing revenue streams and reshaping corporate strategies.⁶⁸ For each response they identified particular actions. For example reconsidering cost structures involves three main drivers: staff costs, administrative costs, and cost of goods sold

^v It was widely reported in the media that high temperatures in Perth (44.4C) on the 5th January 2015 led iiNet to shut down its some of its servers at its Perth data centre leaving thousands of customers without Internet access (E.g. see <http://www.smh.com.au/digital-life/digital-life-news/perth-heat-melts-the-Internet-20150106-12iee2.html>, <https://au.news.yahoo.com/a/25904176/perth-heat-melts-the-Internet/>, <http://www.perthnow.com.au/news/western-australia/heat-warning-as-temperatures-in-perth-forecast-to-soar-to-41c/story-fnhocxo3-1227174069845?nk=4db39b7fdb31a544cc827f096b03bbbc>)

through the supply chain. Regarding staff costs, digital solutions could be used to enhance recruitment; broaden training, knowledge sharing and collaboration; increase flexibility and worker mobility (e.g. teleworking); operate by remote control; access offshore talent; and reconsider workforce management and engagement.⁶⁹ Supply chains may be enhanced by use of real time monitoring and data analytics to improve performance and reliability. Use of cloud-based services can reduce ICT hardware and software purchases as well as reducing risks associated with obsolete organisation-specific ICT systems.⁷⁰ Leveraging social media, building digital strategies, leveraging mobile devices, expanding capacity to innovate, investing in security and guarding against cyber-threats are amongst the other options identified.⁷¹ All involve use of digital technology and the Internet.

Research by TNS on Australian SMEs demonstrated a strong positive correlation between levels of digital engagement and levels of growth.⁷² For example, those SMEs utilising digital marketing strategies such as search engine marketing and optimisation, as opposed to maintaining a simple website, were more likely to experience growth.⁷³ Those SMEs with high levels of digital engagement also expected stronger future growth as well as an increase in employees.⁷⁴ Deloitte also found that digitally engaged firms tended to be more innovative and that highly engaged firms were twice as likely to report revenue growth resulting from new goods and services than firms with low levels of engagement.⁷⁵

2.3 Digital transformation trends in SMEs

Digital transformation by SMEs will impact significantly on the Australia's economy. In 2011-12 SMEs^{vi} accounted for 69% of the Australian workforce and contributed 57% of total business income earned.⁷⁶ In the Territory, this pattern is even more pronounced. In 2014, large businesses (with 200 or more employees) accounted for less than 1% and medium enterprises represented about 5% of all surviving Territory businesses. The Territory's small businesses (with 0-19 employees) accounted 94% of all surviving NT businesses at this time.⁷⁷

At the most basic level the ability and capacity of organisations to transform requires both internal willingness and external assistance. In 2011, research by RDA Northern Rivers found that just over half the businesses in their study (50.5%) thought that high speed broadband (i.e. the NBN) would "significantly improve" their business operation.⁷⁸ Three quarters of the creative industries businesses expected productivity to improve by around 43% and revenue to increase by around 58%.⁷⁹ Similarly, half the businesses surveyed in 2013 by Macquarie Telecom thought that the NBN would change the way they do business. Around half (51%) thought that it would allow them to operate in new geographic markets while 48% expected that it would allow them to target new customers. Around half (51%) expected that it would change the way they engaged with customers, down from 57% who thought this would be the case in 2010.⁸⁰ Reasons for this decrease may include the proliferation of other devices such as tablets, early experiences of the NBN rollout, improvements in wired broadband capabilities such as the upgrade from ADSL to ADSL2+ and businesses already implementing changes to their business operation.⁸¹

Despite these expectations, a substantial proportion of businesses did not feel ready for the expected changes. Deloitte found that while 51% of businesses expected changes in the way they

^{vi} The definitions of SMEs in this report follows that used by the Australian Bureau of Statistics and includes non-employed and micro businesses.

communicated with customers, suppliers and partners, only 24% felt they were ready for this change. Similarly, while 49% expected a change in geographic markets, only 29% were ready for this change.⁸² Kimber and Mason (2013) also found that generally the small businesses in their study were still thinking in terms of 'business as usual' rather than the possibilities for transformation that might be possible as a result of the Next Generation Broadband.⁸³

In contrast, Oxford Economics suggested that transformation was a major trend among SMEs internationally, although one third indicated that they had not engaged in transformation and had no plans to do so.⁸⁴ Of the 10 Australian SMEs in the study, 65% had completed, or were in the process of, a major business transformation. A key priority was to capitalise on growth opportunities in emerging markets, while 62% said they invested in new technology only when there was a clear return on investment and 45% felt the biggest challenge was determining the right mix of technological investment. In terms of leveraging technology, Australian SMEs indicated they would focus spending on business analytics, followed by business management software and mobile technology, rather than cloud computing or social media.⁸⁵

In their study RDA Northern Rivers also asked businesses in regional NSW about the extent to which their use of technology changed over the last financial year. The responses suggested that most businesses online were already experiencing the transformation process to some extent. Over half (54.9%) said it had changed to a minor degree, 31.9% said it had changed to a major degree and 4.7% said it had changed completely. Only 9% said that their use of technology had not changed at all. Businesses in Education and Creative Industries sectors recorded the highest proportions of 'major change' and 'complete change'.⁸⁶

2.4 Federal policy environment

While telecommunications in regional areas have been long been recognised as problematic, in recent years a broader policy environment has emerged that is more conducive to addressing these concerns in the NT. The Australian Government's *Developing Northern Australia* agenda provides a potential economic framework for the improvement of telecommunications in remote areas of Western Australia and Queensland above the Tropic of Capricorn, and all of the NT. The Government sees telecommunications as a critical enabler for regional growth, not just a telecommunications issue. This mind-shift is evident in statements such as "access to mobile phone coverage and broadband Internet is increasingly essential."⁸⁷ Given the establishment and rapid growth of the global digital economy, those that live and work in these areas argue that such access is now critical.⁸⁸

Elsewhere the Australian Government has explicitly recognised that access to reliable and affordable mobile and Internet connectivity is vital in regional areas including those beyond Northern Australia. The following statements in the Government's *Agricultural Competitiveness White Paper* indicate a clear understanding that telecommunications is fundamental to growth in regional and remote areas:

"Access to reliable and affordable mobile phone and Internet coverage in remote and regional areas is essential to Australia's future growth, and the growth of the agriculture sector";

“Enhancing mobile coverage in regional and remote areas also has clear social and economic benefits”; and

“Traditionally, analogue phone services to regional Australia were funded via the Universal Service Obligation levy, however, these traditional policy responses need to be updated so that Internet connectivity can be funded as an essential service.”⁸⁹

Despite this recognition, neither the *Stronger Farmers Stronger Economy*, nor the *Our North Our Future* white papers⁹⁰ have adopted the recommendation of the Joint Select Committee on the Development of Northern Australia that “the Australian Government develop an area specific telecommunications and digital technology strategy.”⁹¹ This recommendation is similar to calls made by others, such as the Broadband 4 the Bush Alliance, for a specific remote telecommunications strategy that addresses not only reliable coverage but lack of choice, affordability, continuity of service, digital literacy and barriers to Indigenous take-up of satellite Internet.⁹² The draft *National Regional and Remote Transport Strategy* also recognised the importance of access to reliable communications for social and economic development, and recommends a telecommunications plan for major freight routes.⁹³

Instead, Australian Government policy has largely focused on the rollout of the NBN and Mobile Black Spot Programme to improve access, speed and reliability of high speed broadband. However, the potential deficiencies in this approach are recognised in Infrastructure Australia’s recent reports,⁹⁴ and they note that:

“...even with the NBN Co broadband rollout, the north, particularly the more remote parts, will lag behind. More creative solutions are needed. These will need cooperation between all levels of government.”⁹⁵

It should also be noted that currently there are disconnects between the Universal Service Obligation (USO) and the NBN policy. The existing arrangements have resulted in multiple policies and models for the delivery and funding of communication services, including the NBN for broadband, Telstra and the USO for telephone services (copper network) and the Mobile Black Spots Programme for mobile network delivery. It is beyond the scope of this report to discuss this issue in further detail, however many submissions to the 2015 Regional Telecommunications Review raised these matters in the context of the need for USO reform⁹⁶.

Compared to physical infrastructure, the Australian Government gives less prominence to policies around developing and enhancing ICT knowledge and skills to effectively participate in a digital economy. Indeed, the Australian Government’s *Our North Our Future* white paper does not explicitly refer to the digital economy or digital strategies. At the Federal level there appears to be a view that telecommunications issues in regional and remote areas are limited to infrastructure and technical matters which the NBN and Mobile Blackspot Programme will address, and does not include issues such as affordability or digital literacy. Yet the Australian Infrastructure Audit report clearly recognises that this is unlikely to be the case: “Following completion of the NBN roll-out, governments will still need to consider what steps are required to provide appropriate and equitable rural and urban telecommunications services.”⁹⁷

In 2012, in addition to infrastructure, the Organisation for Economic Co-operation and Development (OECD) digital agenda emphasised ICT skills and employment, providing more government services online, security of information systems and networks, research and development programs, technology diffusion to business, financial transactions and digital content.⁹⁸ In Australia, the Commonwealth Government has established the Digital Transformation Office (DTO), which aims to ensure a co-ordinated ‘whole of government’ approach to online service delivery through the myGov portal for individuals, new Digital Business Accounts for businesses, and streamlining of Grants administration for 12 agencies online.⁹⁹ A new Digital Service Standard applies to all Australian Government services that have digital services (e.g. agency websites) and high volume (>50,000 p.a.) transactions, such as tax returns. All agencies with high volume transactions are required to develop a Digital Transformation Plan.¹⁰⁰ However, by itself the DTO does not address affordability or digital literacy issues for its end-users.

An analysis of 110 Australian Government business grants and advice programs in 2014 revealed that only one, the Digital Enterprise Program, specifically related to improving digital literacy.¹⁰¹ Continuing until June 2016, this program targets small and medium-sized businesses, and not-for-profit (NFP) organisations. Under the program, free group training is provided in new technologies, how to reach more customers online, use of videoconferencing and how ICT can improve efficiency. An additional four hours of free mentoring was also available after completion of the training session.¹⁰² The only Territory provider of this Program was the Darwin Business Enterprise Centre and their funding to provide the program wound up in December 2014. Despite its name the program was, in reality, the NBN awareness/training program.¹⁰³ In 2013-14, four NT businesses attended the information sessions, 120 attended the first workshop, 112 attended the second and 149 received some form of mentoring.¹⁰⁴ Failure to continue to provide education and training opportunities runs the risk of widening the digital gap, rather than closing it.

2.5 NT policy environment

Currently the NT Government does not have a digital strategy or a clearly defined telecommunications strategy available in the public arena. However its approach is evident in the NT Government submissions to the Joint Select Committee’s *Inquiry into the Development of Northern Australia* and more recently, the 2015 Regional Telecommunications Review. In the former, it suggested that a unified policy and approach between government and service providers was required in order to achieve digital equity and efficiencies in northern Australia. The Committee was advised at that time (2014) that the NT Government had “independently provided optic fibre connections to 34 communities, providing mobile phone and Internet access along the pathway, with a range of satellite systems servicing other communities.”¹⁰⁵

The partnership co-investment approach is reiterated in the NT Government submission to the Regional Telecommunications Review along with a clear and strong preference to reuse existing infrastructure in order to provide terrestrial connected fixed wireless services in remote communities.¹⁰⁶ In their submission they draw attention to the fact that the current NBN policy locks remote users into satellite solutions, which offers an inferior service, even where those remote users currently have access to the fibre optic network:

“The Northern Territory Government considers satellite as the third choice for telecommunications service delivery, after terrestrial optic fibre and radio/wireless

infrastructure. It is self-evident that satellite is not the media of choice for telecommunications service delivery.”¹⁰⁷

Of the 74 Remote^{vii} communities with more than 100 people, 30 communities are serviced with ADSL and mobile coverage is available in 44. There are 33 remote communities connected by optic fibre to Telstra's national network and a number of other communities connected via high-speed radio links providing multiple high-speed channel connections. However some high-speed radio links are technically incapable of delivering any telecommunications beyond the phone. In some areas the inter exchange network is at full capacity and cannot provide any additional services to communities, such as mobiles and broadband.¹⁰⁸

The NT Government has also actively pursued the development of e-health initiatives such as Telehealth, but its capacity has been limited by low bandwidth capacity and the cost of telecommunications in remote communities.¹⁰⁹ Similarly, the Satellite to All Remote Sites (STARS) broadband satellite network and online learning system is limited in what it can deliver and, again, bandwidth is the issue. The STARS network is likely to exceed the capabilities of the NBN Long Term Satellite Solution. It is the NT Government's view that:

“Every opportunity should be taken to minimise the demands on finite satellite resources. The provision of services over terrestrial networks should be prioritised to reduce costs to consumers and maximise the opportunity to deliver satellite communications to areas where there is no other option.”¹¹⁰

It is clear that there is a major policy disconnect between the Australian Government and the NBN, and the NT Government regarding the type of connectivity to be provided in Remote and Very Remote communities. The Federal Government policy that all remote NT communities will be serviced via satellite regardless of their existing infrastructure will leave 33 communities worse off in terms of service quality. The NT Government has described this policy disconnect as follows:

“This outcome is directly at odds with the aims of the NBN and with other Australian Government policy positions and the rigid adherence to this stance remains perplexing... The growing needs of remote communities will require the fibre network connections to be maintained and prices for telecommunications products to be set on the basis of urban parity. This is not assured under the current policy of the Australian Government.”¹¹¹

The NT Government has clearly signalled its intention to “continue to lobby the Australian Government to ensure that significant Northern Territory communities are serviced by the NBN over terrestrial infrastructure.”¹¹² The \$30M joint NT Government-Telstra program to further improve telecommunications infrastructure in remote communities, together with recent announcements regarding funding for the Centre for Appropriate Technology's mobile hotspots, indicates that the NT Government is committed to providing alternative telecommunication infrastructure solutions in Remote and Very Remote communities.

The recently launched *Northern Territory Economic Development Strategy* recognises the need for appropriate telecommunications as an enabler of growth,¹¹³ but specific mechanisms to facilitate

^{vii} Note that some of these communities are located within Very Remote areas under the ABS Remoteness Structure. The collection population of these communities is about 45,000.

Territorians' participation in a global digital economy are not described in this document. Nevertheless some NT Government support is provided in the form of the Department of Business Technical Solutions Program. This program offers assistance for analysis and identification of outdated business technologies and processes, improvements, gap analysis on current technologies and identification, costing and comparison of relevant new technologies.¹¹⁴ A previous grant program aimed at improving the online presence and digital booking systems of small-medium tourism businesses, the Digital Activation Kick-Starter Program, finished in 2014.

With the arrival of the Infrotronics Age, Australia will need to transition to a knowledge-based economy and invest in industries such as technology, biotech and health.¹¹⁵ To increase the digital capacity and capability of organisations, the NBN needs to deliver on its promised increase in broadband speed and reliability, and the Government must also invest in soft infrastructure (e.g. ICT skills development and training). This will facilitate increased use of high bandwidth applications, such as content-rich websites, video conferencing, cloud computing, M2M (machine-to-machine) technologies, and data analytics, and contribute to growth in mobile devices such as tablets and smartphones.¹¹⁶

The next chapter provides a detailed review of Australian national and state-based research into various aspects of ICT adoption and usage, including technology ownership, types of connectivity, Internet usage, digital business strategies, and drivers and barriers to digital transformation and participation in a digital economy. It is noted that this research is focused primarily on urban areas. As such it provides the broader context and, in some instances, contrast, to the DWAT Survey results.

3. Australia's adaptation to a digital economy

This chapter provides a review of 11 key studies of Internet adoption and usage in Australia. As these studies have primarily focused on small business and the NFP sectors in urban areas there remain significant gaps in our knowledge and understanding of digital participation by these sectors in regional and remote NT. The nature and scope of these studies are summarised in Table 3.1.

3.1 Small business

ICT Ownership

It has been found that Australian businesses, particularly SMEs, have high levels of ICT ownership and rely on a range of digital devices, although computers are most commonly used. The Australian Communications and Media Authority (ACMA) study found that desktop personal computers (PCs) are the most common (87%), followed by laptop computers (55%), smartphones (41%) and tablets (24%).¹¹⁷ Digital Business Insights recorded a similar pattern, although the extent of device use/ownership varied according to business size, with medium and large businesses recording greater use of items such as tablets and ipads.¹¹⁸

A recent Sensis study amongst SMEs recorded even higher levels of technology ownership, with computer ownership 98%, smartphones 76% and tablets 52%. The highest level of computer ownership (100%) was recorded in the NT.¹¹⁹ Despite high levels of ownership of computers and other devices, there continues to be a reliance on fixed line telephones. In a 2014 ACMA study 94% of SMEs continued to use a fixed line telephone despite 94% of those firms being connected to the Internet.¹²⁰ The most common form of telecommunications among SMEs was a fixed line telephone, mobile phone, email and facsimile (47%).¹²¹

In the same year Sensis found that a smartphone with Internet access was the most common form of telecommunications equipment owned by businesses (76%), followed by a LAN (69%), satellite navigation system (54%) and tablet (52%). Just over one third of SMEs had an advanced telephony system such as PABX or IVR (32%) or VOIP (38%).¹²² The previous year, ACMA found that 58% and 29% of SMEs used LAN and VOIP respectively.¹²³ Both the ACMA and Sensis research found that medium-sized businesses were more likely to use LAN, advanced telephony systems or VOIP than small businesses, of which most (75%), preferred to use a smartphone with Internet access.¹²⁴ In 2013, Kimber and Mason found that generally there was a poor understanding of VOIP amongst their survey respondents. Some had tried it previously but were unhappy with the quality. Others indicated that they would like to try it owing to perceived cost benefits.¹²⁵ In 2014, Digital Business Insights observed that 24% of respondents in their survey used PABX but that an increasing number were moving to an IP telephony system as their PABX service failed or required upgrading.¹²⁶

These figures regarding technology ownership indicate that in the last 12-18 months there has been a rapid take up of ICT, in particular technologies such as smartphones and tablets. While computer ownership has reached 100% saturation point, it is likely that within the next five years all or nearly all SMEs will be using smartphones and tablets. The extent to which the latter devices will replace the PC is unknown but it is reasonable to expect that more firms will move to portable devices such as laptops and tablets as technology provides for more flexible work arrangements.

Table 3.1. Summary of select studies on Australian Businesses and the Internet undertaken in within the last five years

Source	Year(s) of survey	Sample size ^{viii}	Type of businesses (size)	Geographic scope	Industry scope	Nature and purpose of study
ABS <i>Catalogue 8129 Business Use of Information Technology 2011-12</i> ¹²⁷	2011-12	776	All	Not stated but assumed to cover all states & territories	All industries	Used quantitative data to broadly characterise all aspects of business use of IT
Commonwealth of Australia (ACMA) 2014 ¹²⁸	May 2013	1500	S, M	All states & territories	Included 16 industries although most were in the property and business sector (26%), construction (13%) and retail trade (10%) ¹²⁹ .	Used quantitative & qualitative data to explore how SMEs are using traditional and emerging technologies, their participation in the digital economy as both consumers and facilitators of participation by the broader community, as well as how the Internet is changing traditional business processes relating to customer relationships and service
TNS Australia 2013 ¹³⁰ (detailed report) Deloitte Access Economics 2013a ¹³¹ (contains summary of TNS report with discussion of implications)	Feb 2013	500	S, M (less than 100 employees)	National	All industries	Quantitative & qualitative data to focus on digital strategies and role of digital engagement amongst SMEs and future growth expectations
Digital Business Insights 2014 ¹³²	2013	5090	All	National	Excluded agriculture, utilities & mining	Used quantitative data to examine inter-and intra-industry sector ICT use amongst Australian businesses
Kimber and Mason 2013 ¹³³	2013?	24	S (0-19 employees)	Coffs Harbour NSW	Various, however the table showing participants by industry has not been populated.	Quantitative & qualitative data on how owners use the Internet to support their business, drivers and barriers, attitudes to NGB ^{ix} and local training initiatives

^{viii} Sample size refers to number of participants in the study

^{ix} Next Generation Broadband. NGB refers to data telecommunications systems that have scalable bandwidth (but minimum 25Mbps downstream) symmetric capability (upstream bandwidths are similar or equal to downstream bandwidths), can support services of different quality levels and are ubiquitous in terms of coverage (Kimber and Mason 2013).

Table 3.1. continued.

Source	Year(s) of survey	Sample size ^x	Type of businesses (size)	Geographic scope	Industry scope	Nature and purpose of study
PayPal 2013 ¹³⁴	Sept 2013	507	S (limited to firms with less than 20 employees)	Not specified	Not specified	Used quantitative data to examine levels of digital literacy among small businesses
RDA Northern Inland 2013 ¹³⁵	2013?	Not stated	All sizes but 70% had between 1 and 15 employees	Focus on the Northern Inland region NSW	Includes 13 industries. Construction, wholesale trade and finance sectors not represented	Used quantitative and qualitative data to characterise existing digital use and degree of maturity, identify barriers and opportunities across sectors, identify digital champions, inform on development of a regional digital economic strategy
RDA Northern Rivers 2012 ¹³⁶	May – Sept 2011	277	Not specified but included at least S & M firms ^{xi} .	Focus on the Northern Rivers region NSW	Range of industries but focus on health, education, finance and creative industries	Used quantitative data to establish baseline data for current and future Internet and broadband usage, align the region's broadband needs and opportunities with growth in critical sectors to maximise potential benefits, and inform on development of a regional digital strategy
Riemer <i>et al</i> 2014 ¹³⁷	Aug 2013 – April 2014	62 (10 were International firms)	Not specified	Not specified	Focuses on retailing (bookshops, clothing, department stores, electronic goods, food, furniture, hardware, homeware, supermarkets, discount stores)	Qualitative & quantitative data to examine digital commerce amongst retailers with a focus on customer engagement strategies
Sensis 2014 ¹³⁸	June 2014	1800	S & M	All states & territories	Range of industries but the Agricultural sector is excluded	Annual quantitative survey to examine attitudes towards and experiences with, e-business

^x Sample size refers to number of participants in the study

^{xi} Note that this study focused on how businesses were using the Internet and therefore does not include any non-users in its sample, unlike some of the other studies.

Internet connectivity

Internet connectivity among Australian businesses is high. In 2011-12 the ABS recorded that nearly 92% of Australian businesses had an Internet connection and of these 99% had a broadband connection.¹³⁹ Recently released ABS statistics also found that by mid-2014 the percentage of Australian businesses with an Internet connection was 94.7%.¹⁴⁰ In 2013-14 other researchers documented connectivity levels amongst SMEs at around 94-95% and noted that this is probably close to saturation point.¹⁴¹ Regional SME businesses are just as likely to be connected to the Internet as metropolitan enterprises.¹⁴² In their survey of small businesses in Coffs Harbour, Kimber and Mason found that all had an Internet connection.¹⁴³ Digital Business Insights found that 98% of all businesses were connected to the Internet.¹⁴⁴

In Australia, the most common type of connection is broadband ADSL. In 2011-12 the ABS recorded that 72% of businesses with an Internet connection had an ADSL connection, although large businesses were more likely to have fibre-to-the-premises (25%).¹⁴⁵ By mid-2014 the percentage of businesses with a DSL connection had fallen slightly to 68% while 12.2% and 9.5% had mobile wireless and fixed wireless respectively. Only 1.7% relied on satellite and 2.6% relied on fibre-to-the-premises.¹⁴⁶ The popularity of ADSL/ADSL2+ was also evident in research undertaken by Regional Development Australia (RDA) Northern Rivers where 74% of businesses connected with ADSL, 22% used WiFi, 15.9% USB mobile broadband and just over 2% by satellite. Less than 2% used a standard dial up modem.¹⁴⁷ ACMA reported that in 2013, 87% of connected SMEs used broadband, and of those 75% used ADSL, followed by cable/fibre (9%) and data cards (4%) such as dongles, tablet sim cards and USB modems.¹⁴⁸ Levels of connectivity are even higher among the SMEs in the Sensis study and while the proportion of businesses that used ADSL connections appears to have declined, it still remained the most common type of connection. Of the 95% of firms with some sort of Internet connectivity, 95% had a broadband connection, with ADSL the most popular (58%), followed by wireless (35%) and cable (13%). Only 1% had a satellite connection and 2% connected using the NBN.¹⁴⁹

RDA Northern Rivers noted that the type of Internet connection selected by firms was primarily determined by availability, followed by connection speed, ongoing costs and availability of technical support.¹⁵⁰ ACMA also found that location was a factor in broadband adoption, with regional areas having fewer options. For example, of the 3% of SMEs with a dial up connection, most were located in regional areas.¹⁵¹ Levels of broadband connectivity were highest in NSW (96%) and lowest in Tasmania and the ACT (93%).¹⁵² According to Digital Business Insights research, the NT had the highest rates of satellite connectivity (5%), compared to the national average of 1%. When compared to the national average, the take-up rates in the NT of other forms of connectivity, reflects our remote location and options available (Figure 3.1).

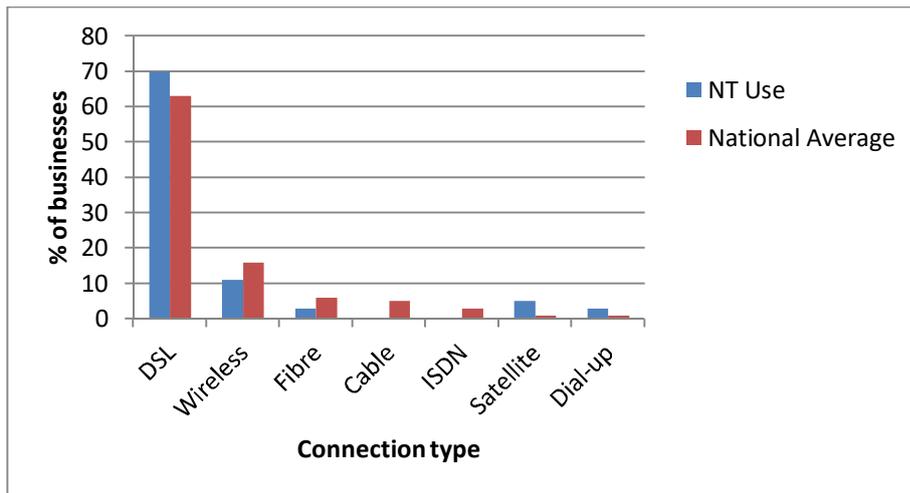


Figure 3.1. Connection types used by NT Businesses compared to the National Average. Data source: Digital Business Insights 2014, p22.

In May 2013, 71% of SMEs were generally satisfied with their Internet service, although satisfaction rates regarding speed, service reliability and costs were varied. The highest dissatisfaction rates related to data speed (15%), speed of repairing faults (14%) and customer service (13%).¹⁵³ However within the last 12-18 months, it seems that Australian SMEs have become more dissatisfied with elements of their Internet service. In mid-2014, 65% of SMEs in the Sensis study reported being satisfied with their upload and download speeds, while 24% were dissatisfied. Levels of satisfaction were only slightly higher in metropolitan areas compared to the regions.¹⁵⁴ Digital Business Insights reported that only 30% of all businesses were happy with their Internet connection speed.¹⁵⁵ Kimber and Mason reported that about 50% of businesses were satisfied with their Internet connection. Those who were dissatisfied cited fluctuating speeds and perception that they were not getting what they paid for from their service provider.¹⁵⁶ RDA Northern Rivers reported similar findings where nearly 50% of businesses experienced connection issues such as slow speed, Internet dropping out, and insufficient bandwidth.¹⁵⁷ Many were unhappy with the cost of the available Internet, which was seen as a barrier to Internet use.¹⁵⁸

In 2011-12, the ABS found that the Accommodation and Food Services sector had the lowest proportion of businesses with an Internet connection (72%) compared with the majority of other industries, which recorded over 90% of businesses with Internet access.¹⁵⁹ However research conducted in 2014 shows a markedly different pattern, with the highest level of Internet connectivity to be found in Communications, Property and Business Services (100%), Accommodation, Café and Restaurant businesses (95%) and lowest levels of Internet connectivity in the Transport and Storage sector (85%).¹⁶⁰ It is suggested that the increasing importance of social media and websites such as Tripadvisor have played a significant role in prompting the Food and Accommodation sector to connect to the Internet and use social media and apps more innovatively.

Usage

The most common activities undertaken online by SMEs were communications, business research and transaction-based activities. Among connected SMEs, 50% undertook seven or more different types of online activities, while 24% undertook fewer than five different types of activities.¹⁶¹ Activities costing money such as advertising, selling products/services online and using

videoconferencing were more likely to be undertaken by medium-sized businesses rather than small businesses. Small businesses seemed to focus on activities that attracted no additional costs such as banking and paying bills.¹⁶² Regional businesses conducted slightly more activities online than metropolitan businesses.¹⁶³

In the 2014 Sensis study, 95% of connected SMEs indicated their primary reason for having an Internet connection was to provide access to email¹⁶⁴ and similar results were found by Kimber and Mason¹⁶⁵ and Digital Business Insights.¹⁶⁶ After email, the most important uses of the Internet were banking, searching for information on products and services, and searching for suppliers of products and services (Figure 3.2). Other uses that were considered essential included paying and receiving payment for goods/services, placing orders for goods/services, obtaining reference information and research data, online catalogues, streamlining communications and using the web to promote their business.¹⁶⁷ In the ABS survey, participants also used the Internet to facilitate staff working from home or other locations; research for business product/service development, methods or processes; online training/learning; and information exchange/data sharing with customers.¹⁶⁸ RDA Northern Rivers reported similar findings in their study.¹⁶⁹

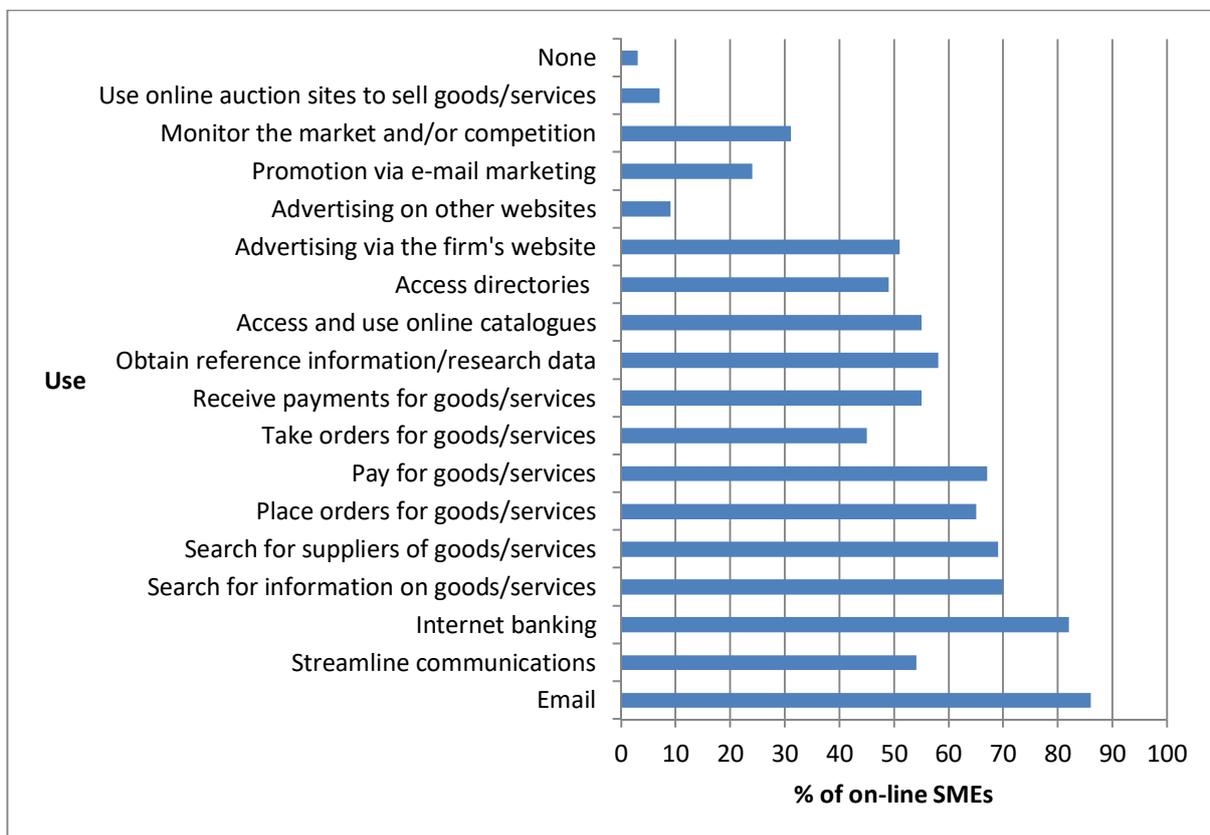


Figure 3.2. Essential uses of the Internet as identified by SMEs who have an Internet connection. Data source: Sensis 2014.

Teleworking

In Australia there has been a growing trend in the incidence of non-standard work arrangements, which is often seen as a response to the emerging 24/7 economy. Teleworking (working from home) or telecommuting is a form of flexible working arrangements, also referred to as working-from-home, working-offsite, or working-at-a-distance.¹⁷⁰ Teleworking appears to be relatively low¹⁷¹

despite commonly cited benefits such as increased productivity, reduction in traffic congestion, reduced pressure on transport infrastructure, cost savings, greater flexibility and mobility, increased employee satisfaction and greater participation in the labour market.¹⁷² For example, based on Household, Income and Labour Dynamics in Australia (HILDA) data, only 16.4% of employees worked some of their usual hours from home at any point in time.¹⁷³ Amongst the business sector, the ABS recorded that 33.3% of businesses used the Internet to facilitate working from home and 31% to work from other locations. Use of the Internet to telework was much higher amongst medium and large businesses compared to small and micro-businesses¹⁷⁴ (Figure 3.3).

Similarly, in 2014 Digital Business Insights reported that on average only 31% of firms used the Internet to enable teleworking. Businesses in the ACT recorded the highest rates of teleworking (53%), with the lowest in South Australia (13%). In the NT, 19% of businesses used the Internet for teleworking.¹⁷⁵ Although relatively low, these figures are nevertheless higher than the 12% of 'all employees' target set by the Australian government in 2011.¹⁷⁶ Generally, organisations in sectors that traditionally involve a hands-on approach such as Construction, Arts and Recreation, and Health Care have tended to have the smallest percentage of workers engaging in telework,¹⁷⁷ in contrast to employees in the Education and Training sector who had the greatest tendency to work some hours from home (51%).¹⁷⁸ Data collected by the ABS indicated that the Professional, Scientific and Technical Services, Telecommunications and Information Media, and Mining sectors had the largest percentage of businesses undertaking telework, however it should be noted that the Education and Training sector was not represented in this survey.¹⁷⁹

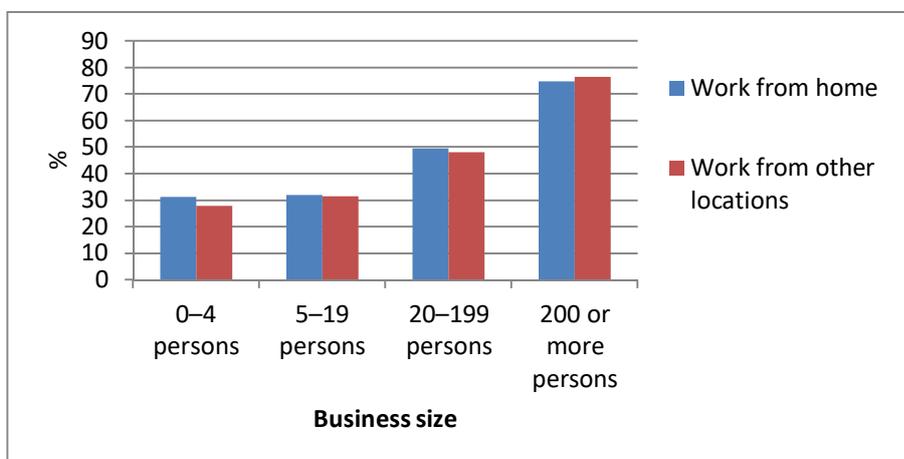


Figure 3.3. Proportions of business that use the Internet to telework according to business size and type of telework, 2014.

Data source: ABS 2015 Catalogue 8129. Business Use of Information Technology 2013-14.

Cloud computing

The range of cloud services on offer is diverse, including off-site storage and backup, media sharing and streaming as well as communication and productivity tools.¹⁸⁰ In one study, ACMA found that 47% of SMEs that connected to the Internet used some form of cloud computing,¹⁸¹ while in their more detailed study of cloud computing in Australia 44% of SMEs were actively using the cloud, and medium-sized businesses were more likely to utilise cloud services (51%) than small businesses (44%).¹⁸²

The most popular cloud services were web-based email (57%), followed by sharing files online (43%), accessing online software (40%) and backing up data (39%).¹⁸³ These figures may be underestimates as ACMA found that people were unaware that popular services such as Gmail, Dropbox, iTunes, Facebook, Twitter, Youtube and Instagram are cloud computing services.¹⁸⁴ This research is at odds with Paypal research that found less than 8% SMEs were using cloud software solutions in their business.¹⁸⁵ Such a discrepancy might be explained by the lack of awareness of what constitutes cloud computing. The ABS also recorded a relatively low percentage of businesses (19.4%) that used paid cloud computing in 2014, although the percentages of small, medium and large businesses that used paid cloud computing was higher (23.6%, 27.6%, 36.9% respectively).¹⁸⁶

According to the ABS, the main advantages of cloud computing cited by SMEs related to convenience and simplicity of use (36%), ability to access data across multiple platforms, and data security. The main reasons SMEs did not use cloud services was a perceived lack of need/suitability for their business (48%) and lack of knowledge (22%). Although the ACMA study identified similar positives, the main negatives cited by consumers related to security concerns and lack of trust in service providers.¹⁸⁷ The Grattan Institute noted that Australian SMEs appeared to lack of awareness of the potential benefits of the cloud, believed that they lack the skills to use cloud services, were concerned about transition costs, data security and privacy, and believed networks were too slow or unreliable in some areas to allow effective use of cloud computing.¹⁸⁸ Similarly, Kimber and Mason (2013) found that most participants in their study did not understand how cloud computing could be used for business. Some were using it but did not have a good understanding how it worked. Some business owners expressed concerns regarding data security of the cloud.¹⁸⁹ The ABS recorded that insufficient knowledge and security risks were identified by 22.8% and 16.2% of businesses respectively, as factors that limited or prevented use of cloud computing.¹⁹⁰

Recruitment

In contrast to the popularity of email, banking, and buying and selling of goods online, a relatively low proportion of Australian businesses (34%) used the Internet for recruitment. NT business use of the Internet for recruitment (41%) was equal highest with the ACT.¹⁹¹ Interestingly, recruitment was not identified as a current or expected usage of the Internet by participants in the Sensis (2014) study of SMEs.¹⁹² This is somewhat surprising given the potential role of recruitment in transformation strategies.

Buying and selling online

While most SMEs have a website providing general information and more than half use it to place orders, many are yet to fully embrace selling online. In 2011-12 most businesses used their website to provide information (97%), followed by provision of an enquiry/contact form (91%) while only 19% had online ordering facilities, and even fewer had online payment capabilities (13%).¹⁹³ Research by TNS in early 2013 documented a similar pattern with only 7% of SMEs offering e-commerce functionality.¹⁹⁴ By 2014, the proportion of enterprises buying and selling online had increased. In 2014, 78% of SMEs purchased 41% goods and services online, while 54% took online orders and 65% received online payments.¹⁹⁵ Of those SMEs taking online orders, NSW and QLD businesses were most likely to take majority of their orders online. In contrast, SMEs in the Territory were least likely take the majority of orders online.¹⁹⁶

The main reason SMEs engaged in online sales was to provide a better service to their customers (83%). In 2011-12 the most common method used by businesses to receive orders was via email not linked to a website (65%), followed by a website with an email linked facility (35%), online order form (17%) and shopping cart (11%). The Telecommunications and Information Media industry were more likely to have online order forms or shopping carts, while businesses in the Accommodation and Food industry were more likely to have an email facility linked to their website.¹⁹⁷ Of connected SMEs not currently selling online, 10% intended to engage in e-commerce in the next year and 33% had no intention of introducing e-commerce to their business.¹⁹⁸

The ABS found that the main reason businesses did not take online orders was a self-perception that the goods/services produced by the business were not suitable (54%), followed by a preference to maintain the existing business model (i.e. face-to-face interaction) (41%). Only 12% identified a lack of customer demand as a reason, 8.5% lack of technical expertise, 8% cost and 2% security concerns.¹⁹⁹ In contrast, Sensis found that the main concern expressed by online SMEs in relation to e-commerce related to security, specifically hacking (44%), followed by lack of computer knowledge/expertise (25%), time and cost to introduce new technologies (23%) and lack of personal contact with the customer (22%).²⁰⁰ When considering what appear to be disparate results from these two studies, it must be noted that security was raised in response to different questions; in the ABS data security concerns were not the main reason for not taking online orders, whereas the Sensis results related to e-commerce more broadly.

Online advertising, Internet presence and social media

Sensis data suggests that the proportion of SMEs with a web presence had reached saturation, with only a slight increase evident over five years to 2013. However, while 64% had a website, only 18% advertised their business on other websites.²⁰¹ By mid-June 2014 Sensis recorded that 66% of SMEs had a website. Of these, 69% said it had improved their business by increasing their exposure.²⁰² However, only 26% of SMEs had a mobile specific or optimised site, while 27% intended to update within the next year.²⁰³ RDA Northern Rivers reported a higher proportion of businesses with a website in their sample (79.1%)²⁰⁴ while Digital Business Insights data, which included all businesses of all sizes, recorded that 82% of businesses had a website.²⁰⁵

Of those SMEs with a website, search engine optimisation (SEO) activities were undertaken by 26% and more than 30% of all SMEs recognised the importance of being on page one of a Google search, particularly those working in Accommodation and Restaurant/Cafés.²⁰⁶ TNS recorded a slightly higher proportion of businesses with a website who also had a mobile optimised site (38%).²⁰⁷ Kimber and Mason recorded that about 33% of businesses in their sample were using SEO. The main reasons cited by participants for not undertaking SEO were cost, perceived lack of need and lack of knowledge/understanding.²⁰⁸

Of those SMEs with a website, 46% outsourced its build, but nearly half (49%) maintained the website in-house.²⁰⁹ In Kimber and Mason's 2013 study, one third of participants had a website they had created themselves, others had outsourced their website development and 8% did not have a website at all. Those that did not have a website cited cost and lack of need; their business only served an existing well-established local clientele.²¹⁰

About one third of SMEs with a website updated their website weekly, while another third updated only a few times a year and 11% had never updated their website.²¹¹ TNS reported that 22% monitored hits on their website, 21% undertook data analytics, 16% monitored customer feedback and 41% didn't measure their website effectiveness at all.²¹² Given that improving customer service is one of the reasons cited by SMEs for establishing an online presence, this information around monitoring/updating suggests a breakdown between motivation and implementation of a digital strategy.

Of course, websites are not the only way to maintain an online presence. Sensis found that for those SMEs without their own website, 32% were listed in an online business directory, 23% were present on a third-party website and 11% used social media.²¹³ Similarly, TNS found that 74% of SMEs were listed in an online business directory and 29% had a social network business page.²¹⁴ Kimber and Mason found that while some businesses (e.g. Accommodation) found that online industry directory listings were beneficial, others found this activity resulted in extra costs.²¹⁵

Of those SMEs that were connected to the Internet, 39% had used social media to promote their business but only 50% of these had some form of tracking activity and only 25% said they updated it daily. A Facebook presence was the most common type of social media utilised by business.²¹⁶ Similarly, Digital Business Insights found that 48% of all businesses used Facebook, followed by LinkedIn (33%) and email news (30%).²¹⁷

According to Sensis, 57% of businesses said they had experienced a positive impact on their business as a result of social media while 41% said it had had no impact.²¹⁸ The ABS found that businesses in the Arts and Recreation industry were most likely to have a social media presence (48%), followed by Telecommunications and Information Media (44%). Only 5% of online businesses in the Transport, Postal and Warehousing industry had a social media presence.²¹⁹ Data collected by Sensis indicated that enterprises in the Accommodation, Café and Restaurant sector were most likely to use social media (76%) while the Construction sector was least likely (20%).²²⁰ Kimber and Mason found that some business owners thought that social media, such as Facebook, was only suitable for personal rather than business networking. Others raised concerns about the amount of time it would take to keep content fresh, and some said they did not understand how it worked and/or that they lacked the skills to use it. A few expressed concerns that a business profile on Facebook would be linked to their personal profile.²²¹ Kimber and Mason found that most businesses were not uploading or downloading video or audio streams because they felt there was no need for it. Those businesses who undertook this kind of activity did so for training purposes.²²²

ICT management

In 2011-2012, the ABS reported that 32% of all businesses surveyed had IT support provided by contractors or consultants, followed by internal IT specialists (22%).²²³ Since then, reliance on contractors or consultants has grown to 36.9% in mid-2014, with less reliance placed on internal specialists (15.6%).²²⁴ Generally, levels of IT support whether internal or external, increased with business size. In 2011-12 smaller businesses were less likely to engage outside support, for example 31% of micro-businesses reported no external IT support, compared with 3.5% of medium-sized and less than 1% of large businesses. Only 15% and 28% of micro and small businesses respectively had internal IT specialists compared to 80% of large firms. Micro-businesses were more likely to rely on

internal staff who were not IT specialists.²²⁵ Similar patterns were evident in mid-2014 although the proportion of micro-businesses that reported no IT support fell to 27.4% and just over 30% relied on contractors or consultants. Use of internal IT specialists declined in all business size categories while there was greater reliance on contractors/consultants and suppliers of hardware and software.²²⁶ These changes may reflect a growing trend towards outsourcing of ICT management across all business.

In 2013, data collected by ACMA showed that 17% of SMEs outsourced the management of their day-to-day communications needs in some form. The most common activity to be outsourced was ongoing service/help desk functions (42%), followed by website design (20%).²²⁷ 2014 Sensis survey results indicated that only 31% of SMEs undertook maintenance in-house, with 41% outsourcing this activity and 28% using a combination of in-house and external IT support.²²⁸ Neither the ACMA nor Sensis research indicated whether or not the in-house support was provided by IT specialists or other non-IT staff.

Digital Business Insights found that firms sought trusted IT advice from various sources but the most common were a consultant (17%) or IT service (16%), followed by the Internet (13%), friends (10%) and family (9%). Smaller organisations were more likely to rely on the Internet, family and friends than medium or large enterprises. In the NT, most businesses (30%) relied on an IT service, followed by the Internet (14%) and consultants (11%).²²⁹ In terms of seeking business advice regarding new technology and best practice, most firms looked to other businesses (73%), newspaper articles (68%) and seminars/workshops (67%). In contrast, government websites, regardless of whether they were state or Commonwealth, were consistently rated the lowest option.²³⁰ Notably, the study by Digital Business Insights found that most businesses wanted the hands-on opportunity to try new technologies.²³¹

It is likely that cost as well as the complexity of an organisation's ICT would influence its choice of ICT support. Micro and small businesses with relatively few and/or simple ICT systems are probably less inclined to obtain external support. The data suggests there is scope for SMEs, particularly smaller firms, to develop greater in-house expertise and expand their digital capability.

Strategies for participation in a digital economy

Research suggests that the adoption of a digital strategy is a key pathway to digital transformation. Investing in ICT requires a long-term strategic plan for the organisation, as well as clear expectations regarding the specific benefits or outcomes of that investment.²³² TNS found that business goals played a role in determining the extent to which businesses were digitally engaged. Those businesses that had growth as a goal were more likely to be highly digitally engaged as opposed to businesses with a goal of simply maintaining/surviving. Those highly engaged SMEs focused on marketing and their online presence as a key business development strategy.²³³

Despite the high levels of Internet connectivity amongst SMEs, research by Sensis in 2014 found that only 19% had some form of digital business strategy although these strategies were generally more comprehensive than in previous years, including Internet, website, mobile and social media components.²³⁴ Most SMEs with a digital strategy had developed it in-house (76%), by their head office/franchisee (12%) or by their usual advertising adviser (11%).²³⁵ Medium-sized businesses were

more likely to have a strategy than small businesses, and of all the jurisdictions, SMEs in the NT were least likely to have a digital strategy (14%). These results are consistent with research by Innovation and Business Skills Australia (IBSA), which indicated that less than 15% of small businesses (employing less than 20 people) had plans to leverage the National Broadband Network (NBN).²³⁶

Economic modelling on ABS data by Campbell *et al* (2013) found that businesses that go online do not automatically become more profitable. Rather it was *how* the enterprise engaged with ICT that was critical in terms of achieving outcomes. They also found that the benefits of investing in ICT were not always evident in the short term but that over five years, those businesses that had invested realised greater profits than those that did not.²³⁷ Riemer *et al* (2014) considered digital commerce in terms of two elements: execution and engagement, whereby execution is defined as ‘the provision of information and facilitation of transactions online’, and engagement as ‘the relationships and social interaction with customers’ in various digital spaces, including social media. Like Campbell *et al*, they argued that it was not sufficient to have an online presence but that engagement was the key to competitive advantage. The latter was closely tied to the effective use of customer data to create tailored offerings with the aim of generating repeat business beyond the initial purchase. They argued that Australian retailers must take a strategic balanced approach that builds both the execution and engagement aspects simultaneously.²³⁸

It is argued that organisations must have the willingness and confidence to develop and successfully implement a digital strategy. In order to gauge business confidence in this area, the Digital Business Insights Australian e-business survey asked participants to rate their ICT adoption as ‘leading edge’, ‘fast follower’, ‘average’, ‘lags behind’ or ‘in trouble’. Most rated themselves as average (46%), followed by fast follower (23%) and lags behind (20%). Only 8% saw themselves as leading edge and only 3% admitted they were in trouble.²³⁹ Amongst Territory businesses, no one said they were in trouble, but 30% said they lagged behind. Just under half rated themselves as average. Only 5% thought they were leading edge.²⁴⁰

Drivers

Adaptive capacity is essentially underpinned by internal willingness and external assistance. In Australia, households have high levels of ICT adoption²⁴¹ and customer expectations are a significant driver behind SME participation in the digital economy.²⁴² As an increasing number of customers expect to be able to access a wide range of goods and services online 24 hours a day, seven days a week, studies suggest that most SMEs recognise the need to participate in a digital economy, whether through communications, advertising and/or facilitating online orders and payments.²⁴³ Other drivers of online engagement include being able to work away from the office, presence of business owners and/or staff who have ICT skills, being able to access industry sector support, and desire to increase efficiency.²⁴⁴

Barriers

Research indicates that some Australian SMEs still believe that face-to-face interaction is more important and better suited to their businesses.²⁴⁵ These businesses run the risk of being caught out when their customers’ expectations shift. Of those firms that did not have an Internet connection, Sensis found that the main reason was that they had not found a need for it although, of these, 26% said that they intended to connect in the next 12 months.²⁴⁶ TNS found that doubt about the

importance of the Internet was most prevalent amongst SMEs with low levels of digital engagement. Whereas 41% of SMEs with high levels of digital engagement thought that the Internet would become more important within the next 12 months, this was true for only 10% of those with very low levels of digital engagement. TNS identified the need to convince those less engaged SMEs of the importance of the Internet.²⁴⁷

In addition to the belief that the Internet is not relevant to a particular business, factors such as lack of awareness/knowledge of what actions to take, cost and perceived risk of change were also identified as barriers to digital engagement.²⁴⁸ Similarly, Campbell *et al* (2013) identified barriers including not understanding the benefits of online applications; lacking the time and financial resources to implement and manage online applications; perception that current business practices are adequate; lack of access to trusted ICT suppliers; and lack of funds to outsource ICT skills.²⁴⁹ Kimber and Mason (2013) found that barriers included a perception that the business was not suited to digital technology; lack of desire to change; and lack of awareness of the potential benefits. Additionally, time required to maintain websites and social media, as well as cost and lack of access to appropriate IT skills were all cited as reasons for not engaging with the Internet. A few participants had had negative experiences relating to customer enquiries from markets they did not intend to target.²⁵⁰

According to ISBA, participation in the digital economy is a function of two factors: affordable access to ICT and broadband and the skills to use it effectively.²⁵¹ While the recent IBSA study of digital literacy found that national efforts have been made to address access issues, ICT skills training has not kept pace with demand. IBSA found that small business was at particular risk of digital exclusion. They argued that overcoming low levels of digital literacy, particularly among small businesses in rural and regional areas, is proving to be a greater hurdle than previously anticipated.²⁵² In a separate survey of over 70 SMEs in the earliest NBN release sites, ISBA found that initial enthusiasm for the NBN quickly gave way to frustration as businesses realised that they lacked the skills to be able to make the most of the new technology.²⁵³ Participants identified a range of e-skills they lacked which ranged from web development, to being able to sell online, small office and home office network setup, managing communications and systems security, to social networking.²⁵⁴

Similarly, the ACMA study found that 60% of SMEs felt they lacked knowledge regarding the digital environment (60%)²⁵⁵ and, of these, only 51% had attempted to improve their knowledge, mainly through online searches or tutorials. The three main areas in which SMEs wished to improve their knowledge were developing a web presence (30%), using cloud-based solutions (25%) and accepting online payments (19%).²⁵⁶ Regarding business processes, the ACMA study suggested that SMEs were more confident and/or capable of using digital technology for businesses processes that did not involve direct interaction with customers. For example, while just under half of all SMEs (47%) reported that they used some type of cloud computing service (e.g. web-based email and data storage services), only 26% used social networking channels to market their goods and services. Only 18% had developed mobile-optimised websites and a mere 4% had developed mobile applications to allow online service delivery to customers.²⁵⁷

In its 2013 study of digital literacy amongst 507 Australian SMEs, Paypal found that 60% felt low levels of digital literacy were preventing them from running their businesses more efficiently. At the

same time, 65% said that conducting business online was the key to growth, but only 14% felt that they were making the most of the Internet. For example, while 89% used the Internet to communicate or inform, only 26% used it for sales. However 30% wanted to sell goods/services via their website and 26% wanted to be able to accept payments on their website. Some 79% of the SMEs felt that there should be more help and advice regarding how to embrace the digital economy. The SMEs in this study felt that the best way for them to improve their own levels of digital literacy was via a fully-funded training course, followed by access to a website with advice for small business.²⁵⁸

The Paypal and ACMA findings are consistent with research undertaken in other OECD countries where, although there are high levels of Internet connectivity, there remain barriers to SMEs participation in the digital economy.²⁵⁹ Campbell *et al*, Kimber and Mason, and Digital Business also identified company leadership as a major barrier to ICT adoption, specifically in the case of older CEOs and managers who do not fully understand or are intimidated by technology.²⁶⁰ In contrast to these studies, Oxford Economics found in their 2013 study that rather than conforming to the “entrenched stereotypes” of SMEs as being local or regional technophobic entities, many SMEs felt they were equipped to compete with larger firms.²⁶¹ However it should be noted that the 2100 SMEs from 21 countries (including Australia) included in this study had revenue over \$20M and only one third conducted business in their home country.²⁶² It is therefore likely that the SMEs in this study had a high capacity, capability and confidence to participate more fully in the digital economy. Nevertheless, these findings may be relevant to the Territory, particularly given the focus on increasing business with Asia and developing Northern Australia.

The emphasis on barriers such as lack of confidence and skills development in these studies is perhaps a reflection of their metro-centric focus; inadequate Internet access is not generally an issue in metropolitan areas. Digital Business Insights recorded various barriers relating to cost, poor connection speed, slow roll-out of the NBN, level of comfort with new technology, ability to access trusted IT advice and support, training and education, and integration (businesses wanting their software to be able to talk to each other), as well as attitudes of senior management. They also identified barriers within industry and local government.²⁶³ Interestingly, in contrast to the findings of ACMA, Campbell *et al*, and Deloitte,²⁶⁴ speed and coverage featured more prominently as barriers for Internet use in the Northern Rivers study, which focused on a regional area.²⁶⁵ RDA Northern Rivers found that just over 73% of businesses felt they were not using the Internet to its full potential²⁶⁶ and identified slow/inadequate speed (73%) and lack of coverage (35%) as barriers, followed by lack of knowledge/understanding (31%). Although only 3.6% of all businesses identified cost/time as a barrier,²⁶⁷ the importance of cost should not be underestimated. Almost 82% of businesses said they would subscribe to high speed broadband if it was available at an affordable price²⁶⁸ and 76% felt that cost was an area that Government should address, along with greater understanding/knowledge (29%) and information/training sessions (28%).²⁶⁹

These results are not an isolated example of poor telecommunications infrastructure as a barrier to digital business. Numerous submissions to the 2015 Regional Telecommunications Review leave no room for doubt that telecommunications shortcomings such as lack of infrastructure, mobile black spots, slow Internet connections, service disruptions and drop outs, issues with wireless connectivity, limited choices of telecommunication packages and high prices represent significant

barriers for small businesses in regional and remote areas.²⁷⁰ The 2015 Regional Telecommunications Review, lists the following services that regional and remote SMEs are unable to access:

- Educational/professional development opportunities;
- Real time market prices for their products;
- Ability to communicate with staff while working;
- Instructional information relating to plant and equipment;
- Ordering parts and accessories and online; and
- Online education for their children and employees children.²⁷¹

3.2 Not-For-Profits

There are fewer studies of the digital capacity of Australian NFPs, which is perhaps the result of a perception that NFPs do not substantially contribute to the economy. However this is clearly not the case. There are over 700,000 registered NFPs in Australia, although for practical purposes it is estimated that there are 60,000 active, funded NFPs and 60,000 active, non-funded bodies.²⁷² Research by the Productivity Commission in 2010 revealed that the NFP sector contributed \$43 billion to the Australian economy and 8% of employment in 2006-7.²⁷³ More recently, the ABS released figures that showed that the sector contributed \$55 billion to the economy in 2012-13 and employed more than one million people.²⁷⁴

The sector comprises both public-serving and member-serving organisations. The former generally delivers services in the areas of health, education and community services, whilst the latter includes sport, recreation and interest groups, such as peak bodies, religious organisations, lobby groups, professional and business associations.

Technology ownership and connectivity

Of the NFPs surveyed by Digital Business Insights in 2013, 92% used the Internet. 92% used the telephone, followed by a mobile phone (77%), fax (66%), smartphone (55%) and VOIP (20%). Only 4% used a fully integrated telecommunications system. The most commonly used device was a PC (80%), followed by laptops (52%) and tablets/ipads (12%). It was noted that most organisations used a combination of telecommunications and devices depending on the time of day and nature of the work.²⁷⁵ In this regard they were not noticeably different from the business sector.

Usage

The primary use of the Internet by NFPs is for email (96%), banking (75%), searching (71%), ordering (58%) and buying online (56%), and recruitment (40%).²⁷⁶ This pattern is similar to that observed in the business sector. 37% of participants indicated that they had at least one staff member teleworking for at least part of the week.²⁷⁷ About 27% of NFPs used cloud storage to supplement other backup systems, most commonly external hard drives (59%) or USB sticks (42%).²⁷⁸ Despite the use of cloud storage, for most NFPs cloud computing remains near the bottom of their ICT objectives. Concerns were raised around data ownership, privacy, location and legal responsibilities associated with the use of cloud services.²⁷⁹

The most frequently used tools to communicate with clients were email news (58%) and Facebook (58%), followed by videoconferencing (27%) and LinkedIn (26%).²⁸⁰ While some industries such as

the Creative and Performing Arts sector embrace social media, around 20% of NFPs don't use it all owing to concerns about social media abuse, governance and privacy. This was particularly evident amongst those working in areas such as Housing, Family Services and Aged Care.²⁸¹ Nevertheless, in 2013 most NFP organisations (87%) had a website,²⁸² up from 83% in 2011.²⁸³

ICT Management

Sources of trusted IT advice accessed by NFPs varied according to the size of the organisation. Smaller organisations relied more on their hardware supplier (26%) than larger organisations (21%), followed by those who relied on the Internet (15%, compared to 9% of large NFPs). Medium and large-sized organisations tended to use their systems integrator (25% and 28% respectively) or consultants (22%) as their main sources of trusted advice.²⁸⁴ While the business sector mostly looked to other business organisations for sources of trusted advice, most NFPs looked to other NFP organisations as the main source of trusted business advice and best practice.

Just as businesses rated what was then the Commonwealth Department of Business, Communications and the Digital Economy (DBCDE) and other government websites poorly, so too did the NFP sector.²⁸⁵ Both sectors preferred that the information came to them, rather than having to seek out the information from government websites, industry related magazines, etc.²⁸⁶

Amongst NFP organisations, 35% of participants said they had a formal IT plan.²⁸⁷ Their main objectives relating to IT included: maximising their existing IT system (76%); managing security and disaster recovery (75% each); introducing new applications (73%) and improving service to clients (71%).²⁸⁸

Strategies for participation in a digital economy

In 2012, RDA Brisbane undertook a study to analyse the level of digital engagement of small and medium-sized NFP organisations, using Glentworth's Digital Engagement Maturity Model. This model identifies five levels of engagement: aware, reactive, proactive, managed and optimised.²⁸⁹ Although the survey included some organisations that had more than 100 employees, non-employing, micro and small organisations comprised the bulk of the survey sample. Of the 79 participants in the survey, over 45% had five or fewer employees and nearly half (49.2%) had between 0 and 10 volunteers.²⁹⁰ Like the business sector, the most frequently used digital engagement tools were email and websites. However a significant proportion of participants said that they had never used, or only infrequently used, social media such as Facebook, Twitter, newsfeeds, blogs or instant messaging. Relatively few of the organisations used search engine advertising or search engine optimisation. The report noted that small organisations may not be using social media because they did not have the capacity in terms of funds or other resources to sustain online growth.²⁹¹ In terms of digital engagement, the study found that NFPs generally had a low level of awareness and understanding of digital engagement tools and characterised their level of engagement as reactive. While there was limited use of some digital engagement tools, they did not have a significant online presence.²⁹²

Nevertheless, Figure 5 in the RDA Brisbane report suggests that at least some organisations were using digital engagement tools such as email, Facebook, Twitter, websites, blogs, and newsfeeds primarily to send out communication and increase efficiency. Organisations indicated the main

strategy they would implement within the next 12 months was enhancing their website, followed by Facebook and search engine optimisation.²⁹³ Interestingly, the report recommended providing programs that explain the return on investment (ROI) of digital engagement, followed by programs improving digital literacy and specifically targeting use of social media and online monitoring of trends/data analytics.²⁹⁴ In the NFP context, which tends to be characterised by very tight budgets, better understanding of ROI may overcome the barriers of time and cost. However, programs aimed at boosting internal digital literacy may be more beneficial, particularly if those programs can be delivered online at low/no cost to the NFP sector. The report does not discuss the extent to which different NFP organisations felt their service was suitable for digital engagement, and if so, the most appropriate ways of engaging with their clientele. Such an analysis would be useful in terms of contributing to the development of digital literacy learning programs.

Drivers and barriers

Lack of time and budget constraints were cited as key barriers to optimal digital engagement, followed by lack of understanding, difficulty identifying the right skills and adverse organisational culture. Cost was identified as an important issue for NFPs, with little money available for equipment, software and training. While affordability issues have been partly addressed by organisations through the use of Connecting Up’s Donations and Discounts program, it remains problematic for many, along with access to appropriate software.²⁹⁵ As with the business sector, the attitudes of CEOs were also raised as a potential barrier.²⁹⁶ Around one third of participants raised concerns regarding security and complexity of technology, just over 20% indicated that digital business activities were a low priority and less than 5% identified lack of access to the Internet as a barrier.²⁹⁷

In 2013, Digital Business Insights undertook a larger study of the Australian NFP sector. A total of 1,569 participants participated in their survey from all states, working in a wide range of sectors and representing micro, small, medium and large enterprises.²⁹⁸ This study found that the NFP sector was less confident in ICT use than any other sector, with little money available for expenditure on ICT related equipment, software and training.²⁹⁹ A higher proportion of NFPs rated themselves as ‘lagging behind’ or ‘in trouble’ compared to the business sector (Figure 3.4).

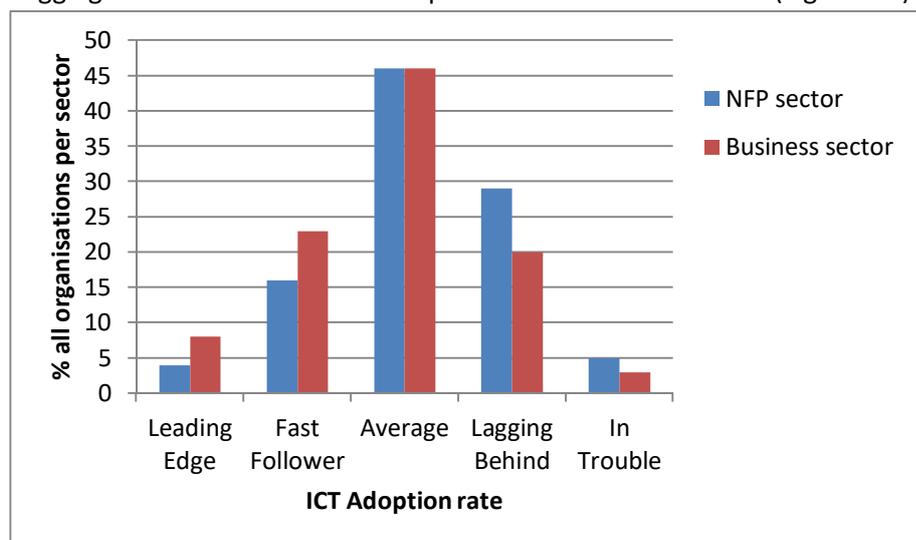


Figure 3.4. Self-assessment of ICT adoption rates by sector.
Data source: Digital Business Insights 2013, p8; 2014, p27.

The national and state-based research reviewed in this chapter provides an overview of Internet usage among Australian SMEs and NFPs. While primarily focused on metropolitan areas or larger urban centres, this research nonetheless provides relevant context for interpreting DWAT Survey findings. The following Part of this report (chapters 4 – 9) will present the DWAT Survey results, which aim to provide clear knowledge and understanding of ICT and Internet usage in Outer Regional, Remote and Very remote areas of the NT.

Part II

“...competition in the Digital Economy is primarily a function of two factors: affordable access to information technology and high-speed broadband and secondly, the skills to effectively use ICT.”

– Innovation and Business Skills Australia, 2013³⁰⁰

4. Introduction to the DWAT Survey

This chapter briefly describes the survey design and methodology that underpinned the Digital Workplace Assessment Tool. It also provides a broad profile of survey participants in terms of type and size of workplace, industry representation, location and remoteness, provision of services to areas with limited/no telecommunications, and non-users of the internet in the workplace.

4.1 Scope

The DWAT Survey aims to address the gap in knowledge and understanding of the digital capacity and capability of organisations in regional and remote areas of the NT. Specifically it aims to capture data relating to the significant service economy that operates beyond the Darwin-Palmerston area, in Remote and Very Remote regions of the NT, as defined by the ABS Remoteness Structure. Given the relatively small size of the NT economy and importance of Government and the NFP sector as major employers, the DWAT Survey includes government and NFP/community groups, as well as the business sector.

There is significant potential for a digital economy to mitigate some of the factors that have traditionally challenged the delivery of goods and services in Remote and Very Remote areas of the NT such as high transport and fuel costs, infrastructure and so on. Organisations in these areas have a particular reliance on telecommunications that differs from their metropolitan counterparts.³⁰¹

4.2 Survey design and methodology

Developed in 2013-14, the DWAT Survey focused on aspects of connectivity, Internet usage, digital capability and capacity in NT workplaces. A pilot of the survey form was tested by individuals from several different organisations in the first half of 2014 and then further refinements were made to the layout and questions. Survey questions are listed in Appendix A.

The majority of respondents self-selected to participate in the study via a web-based survey form that collected both quantitative and qualitative data regarding the nature and extent of the respondents' workplace ICT usage and aspirations, as well as questions which aimed at identifying particular barriers. The information was then imported into an Excel spreadsheet. Some respondents elected to participate in the survey via telephone or paper based forms, and these responses were manually entered into the database. All respondents were de-identified prior to any analysis.

It is important to note that there was a wide range of work-roles amongst respondents, including chief executive officers, managers, chief financial officers, IT specialists and support personnel, other administrative staff, professionals and non-ICT specialists. Accordingly, it cannot be assumed that the respondents were the most IT-savvy person in their workplace. It should also be noted that in several instances respondents working from different locations in the same organisation provided different answers, suggesting that individual workplace practices may vary within an organisation.

4.3 Use of DWAT data in this report

It should be noted that the DWAT figures have not been weighted, but represent the raw data. Not all respondents completed the survey form in its entirety but all responses to each question are included in the analyses, except where otherwise noted. In this report, chi-square testing (χ^2) has

been used to test theoretical assumptions or expectations against categorical (i.e. non-numerical) data such as workplace type, location or industry sector. Chi-square testing indicates whether or not the relative proportions of such variables are significant. Respondents who did not answer or answered with 'don't know' were excluded from these tests.

4.4 Profile of survey participants

There were 160 participants in the DWAT Survey from 108 different organisations^{xii} across the government, NFP/community group and business sectors. Survey participants are characterised in more detail below.

Workplace type

As shown in Figure 4.1, most of the respondents were from the NFP/community sector (48.1%), followed by government agencies (34.4%) and business (16.2%). When the type of workplace was simply classified as government or non-government, the proportion of respondents that worked for government organisations was slightly higher (34.3%) than for the entire NT working population³⁰² (30.4%), while the proportion of respondents that worked for non-government organisations (65%) was slightly lower than for the wider NT working population (69.5%) however these differences are not considered significant. It is argued that the survey sample is broadly representative of the NT as a whole in this regard.

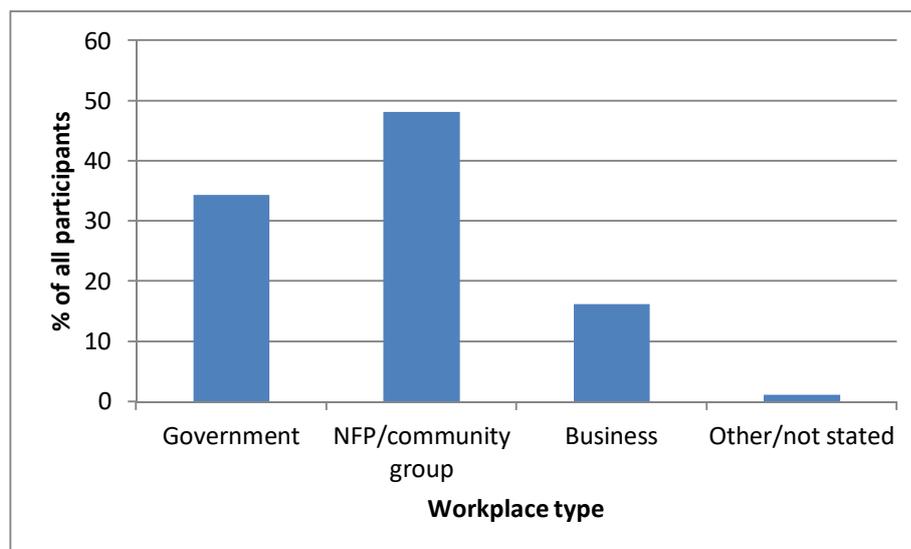


Figure 4.1. Frequency distribution of workplace types represented in the DWAT survey.

Workplace size

Individuals from small, medium and large workplaces participated in the survey although, as shown in Figure 4.2, micro and non-employed organisations with 0-5 employees dominated the sample. Large workplaces with over 200 staff were represented by 6% of respondents. In terms of respondents from business workplaces who participated in the survey (n=28), just under 43% had 0-

^{xii} In these counts, service centres of Regional Councils were counted as one organisation. Similarly, regional branches of organisations were not considered to be a different organisation from the parent organisation although they were considered to be different workplaces.

5 employees, 21.4% had 6-25 employees and 10.7% had between 101 and 200 employees while 3.6% had more than 200 staff.

Possibly owing to the relatively small sample sizes, the proportion of large enterprises in the survey is over-represented and small businesses under-represented compared to the Territory as a whole. For example, at the end of June 2013, 96.2% of all Territory businesses fell into the ABS category of small business (0-19 employees), 3.8% medium (20-200 employees) and just 0.06% were large businesses with more than 200 employees. Non-employed and micro-businesses (0-4 employees) represented 63.6% and 23.6% of all businesses in the NT at that time.³⁰³

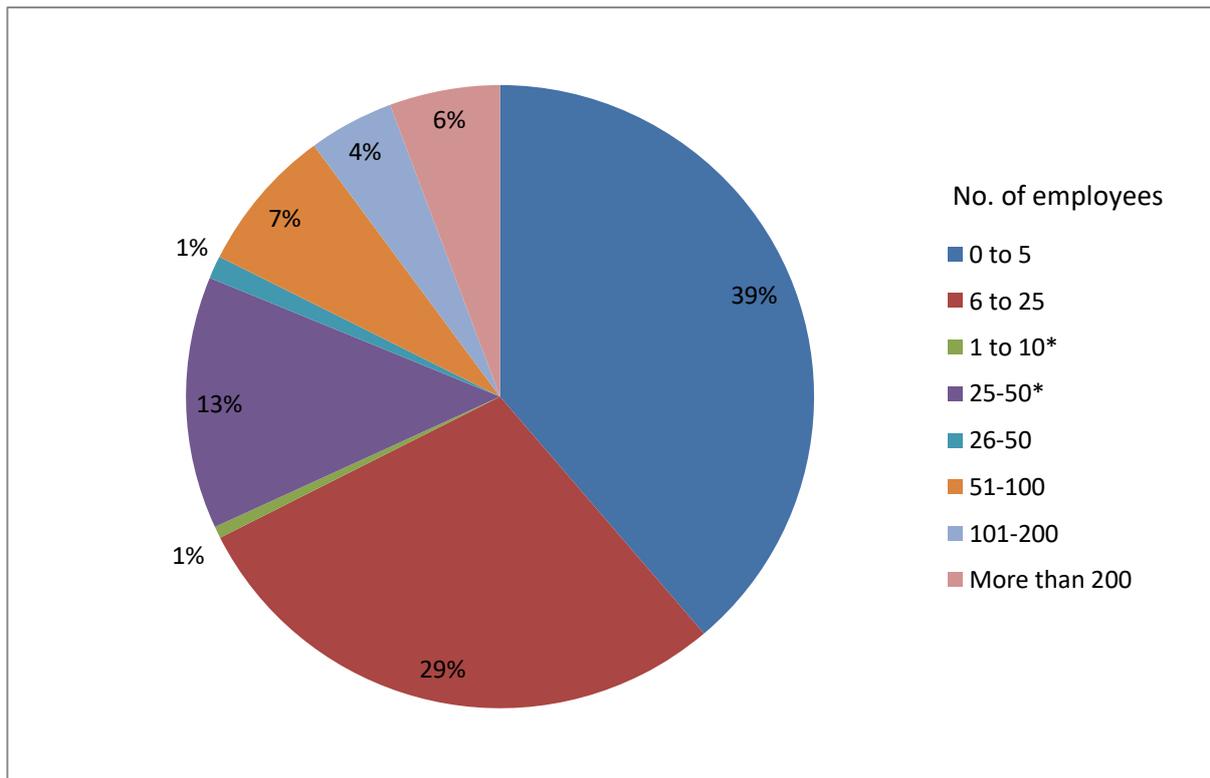


Figure 4.2. Percentage distribution of workplace sizes represented in the DWAT survey. Categories marked with an * were not on the survey form but were indicated by some participants themselves on paper forms.

Industry representation

The top five industries represented in the DWAT Survey were Other Services (religious services, personal services, etc) (18.8%); Healthcare and Social services (16.9%); Arts and Recreational Services (14.4%); and Public Administration and Safety (13.1%); and Education and Training (11.9%). As shown in Figure 4.3, this distribution does not reflect the proportion of all Territorians who work in these different industries. Instead, the DWAT Survey sample reflects the sectors most active in Remote and Very Remote areas of the NT, thus the Health, Education, and Arts and Recreation sectors are over-represented, and Accommodation and Food Services, and Retail Trade are under-represented. Some industries were not represented at all, such as Wholesale Trade, Rental, Hiring and Real Estate Services, Electricity, Gas, Water and Waste Services. Accordingly this data should be treated cautiously in terms of its industry representation. Note also that respondents to the DWAT Survey were not prevented from selecting more than one industry as being relevant to the types of activities conducted in their workplace, although only two chose to do so.

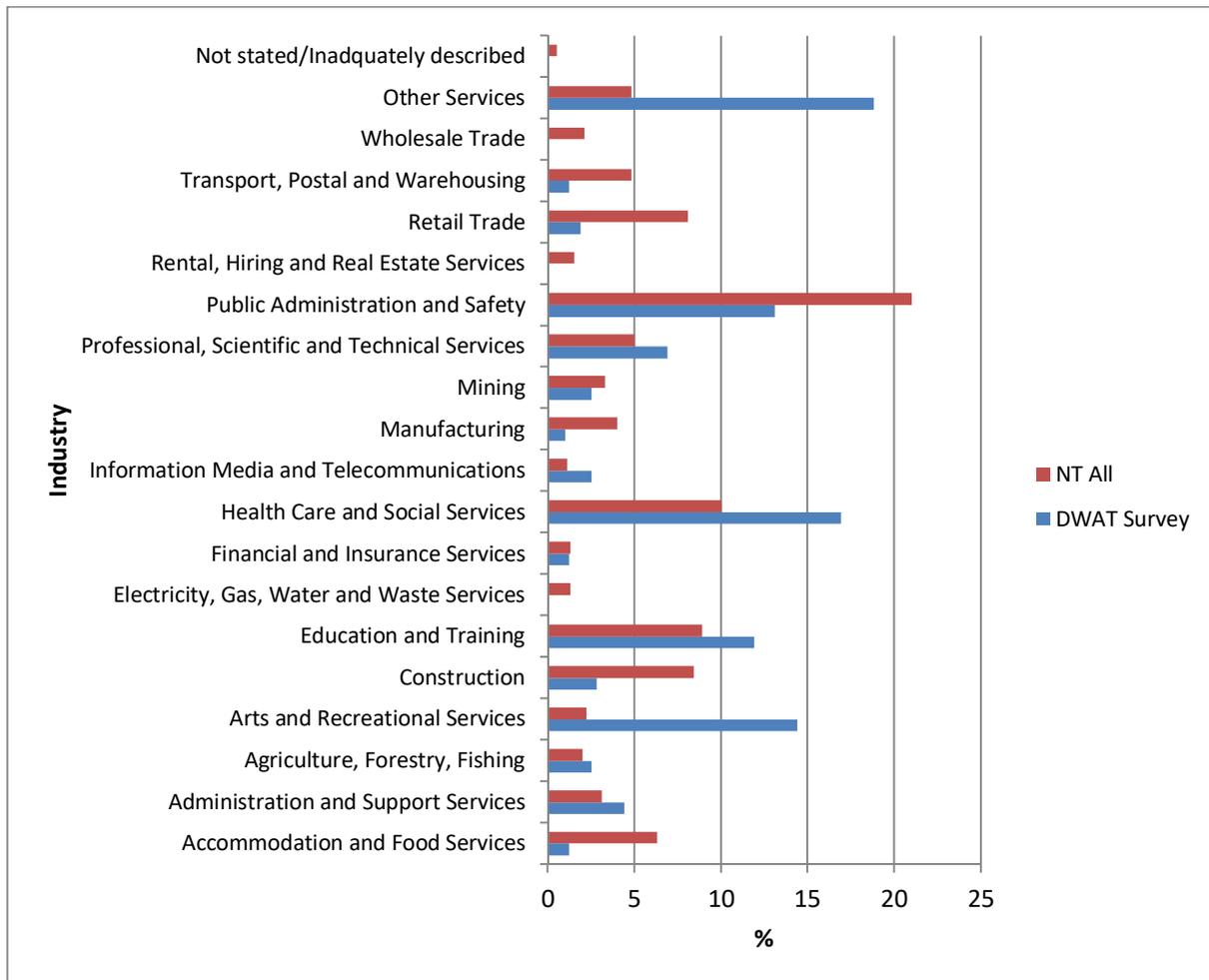


Figure 4.3. Industry representation in the DWAT Survey compared to the NT as a whole.
 Data source: NT All data from the 2011 ABS Census of Population and Housing.

Location (remoteness) of workplaces

Respondents were located across the Territory (Figure 4.4) although the majority were located in Alice Springs and Darwin-Palmerston regions followed by East Arnhem, Barkly and MacDonnell LGAs. When these results were compared to the distribution of all NT workplaces in 2011,³⁰⁴ the Darwin-Palmerston region (46.1% of all workplaces) is under-represented, whilst Alice Springs (11.5%), Barkly (1.9%), East Arnhem (3%), Victoria-Daly (1.7%) and McDonnell (2%) are over-represented.

The ABS Remoteness Structure was applied to the database, on the basis of the physical location of each workplace. The majority of participant’s workplaces were situated in Remote areas (39.4%), followed by Very Remote (35%) and Outer Regional (25.6%) areas. The relatively high proportion of workplaces in Remote and Very Remote areas is a distinguishing feature of this study.

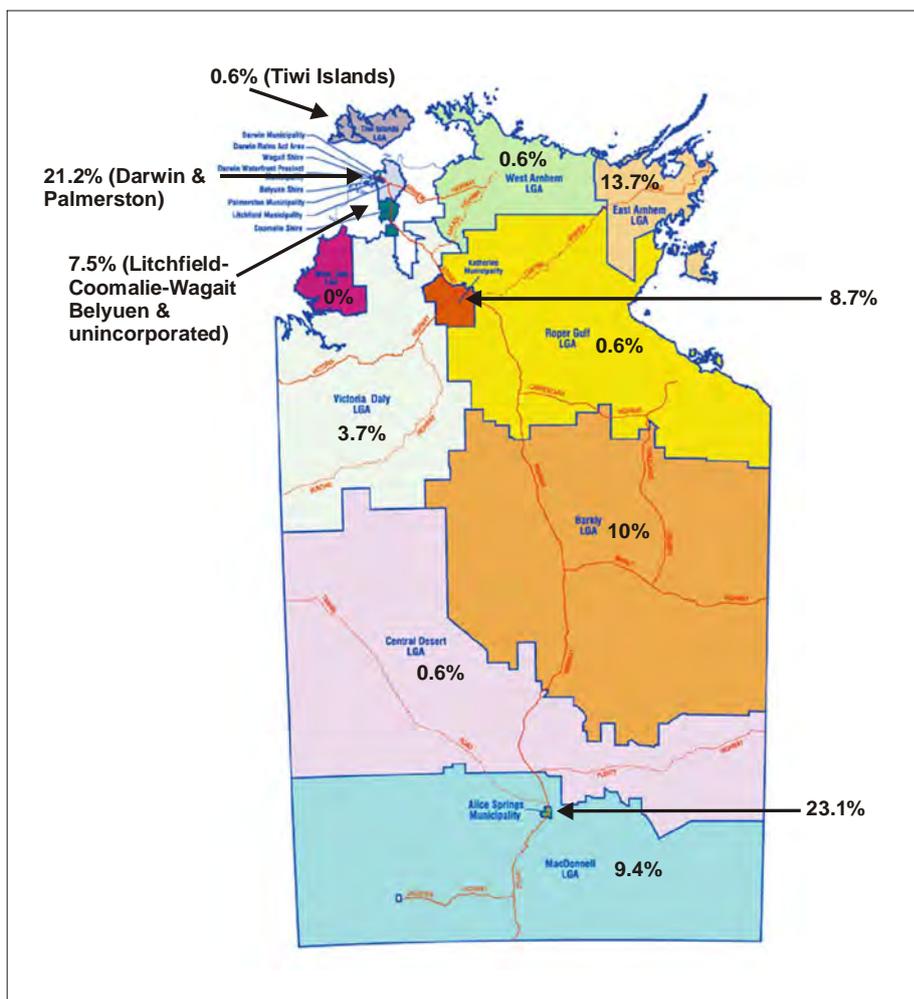


Figure 4.4. Location of participants across the NT shown as a percentage of all participants.

In terms of sector representation, respondents from NFP/community group workplaces dominated the Outer Regional group whereas government employees were dominant in the Very Remote group of respondents (Figure 4.5). This is consistent with government being a major source of employment in Very Remote areas of the Territory.

In order to facilitate a more fine-grained analysis, each respondents' workplace location was further classified as urban or non-urban according to whether or not their workplace was based in one of four main centres: Darwin-Palmerston, Katherine, Tennant Creek and Alice Springs. These urban areas are all situated on the Stuart Highway, the main transport and telecommunications route through the NT, which closely parallels the route of the Territory's earlier telecommunications infrastructure, the Overland Telegraph Line. The historical bias towards development of a strong north-south communications and transport route (compared to east-west across the NT) continues to the current day. Accordingly these centres tend to have access to greater telecommunications choices, compared to settlements not situated on the Stuart Highway. On this basis, 65.6% of respondents were based in urban areas and 34.4% in non-urban areas.

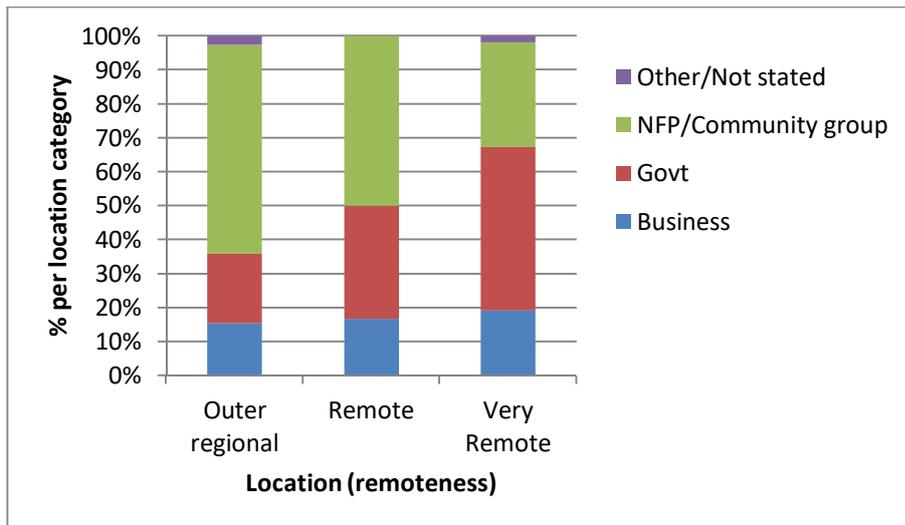


Figure 4.5. Location (remoteness) of participants with Internet access by workplace type.

Provision of services to rural and remote areas with limited/no telecommunications

The majority of individuals that participated in the DWAT Survey (63.8%) were based in workplaces that provided services to rural and/or remote areas with limited/no telecommunications. Of the respondents that provided services to these areas (n=102), 40.2% were government and 42.1% were NFP/community groups, with the remainder from the business sector. This should not be interpreted to mean that few businesses provided services to these areas as almost two-thirds of respondents from business workplaces (64.3%) indicated that they provided services to rural/remote areas with limited/no telecommunications.

Workplaces in Indigenous organisations

For the purposes of potential data analysis, a respondent's workplace was defined as being part of an Indigenous organisation if it comprised a Land Council, entity registered with the Office of the Registrar of Indigenous Corporations, and/or identified as an Indigenous organisation on their website. On this basis, 22 respondents (13.8%) worked in an Indigenous workplace. This proportion is broadly consistent with the proportion of the NT labour force that identified as Indigenous (15%) in 2011.³⁰⁵ The small sample size for this group precluded any further analyses which might have identified issues specific to Indigenous workplaces.

Non-users of the Internet in the workplace

Of the 160 respondents, 5% (n=8) were non-users of the Internet at work. Of these, 75% (n=6) indicated that they did not use the Internet because it was not available in their area. Of the remaining two, one indicated that they were in the process of establishing Internet connections onsite. The other non-user responded No to Question 26: "Does your workplace believe reliable Internet access is essential to your workplace?" which suggests the Internet is not perceived as relevant or useful to that particular organisation.

Non-users who indicated that the Internet was not available in their area were all located in Remote (n=2) and Very Remote areas (n=4), as defined by the ABS Remoteness Index. However the two in Remote locations were based in the urban centres of Katherine and Alice Springs respectively, suggesting their workplaces were situated in telecommunications 'black spots' i.e. not eligible for

satellite coverage but outside existing cable/fibre, mobile, wireless footprints. Although comprising only a miniscule sample, these results indicate that even within built-up urban areas of the Territory there are still gaps in terms of reliable access to the Internet. The other non-users were located in the Victoria-Daly region (n=3), Litchfield (n = 1), Darwin-Palmerston (n=1) and Barkly regions (n=1). All non-users were excluded from any further analyses.

5. Connectivity

Information in Chapter 3 indicated that although there is a high level of pc ownership and internet connectivity amongst Australian SMEs and NFPs the extent to which organisations are able to adapt to a digital economy remains highly variable. This chapter explores type of connectivity, adequacy of existing access to the internet and use of mobile technologies and device by participants in the DWAT survey.

5.1. Ownership

Although questions regarding ownership of ICT were not specifically asked as part of the Survey, research conducted by Sensis around the same time found that there was a high level of computer ownership (100%) amongst small to medium-sized enterprises (SMEs) in the NT. NT business use of the Internet, phone, mobile and fax is above the national average, although the use of smartphones, VOIP and Unified Comms is below average³⁰⁶ (Figure 5.1).

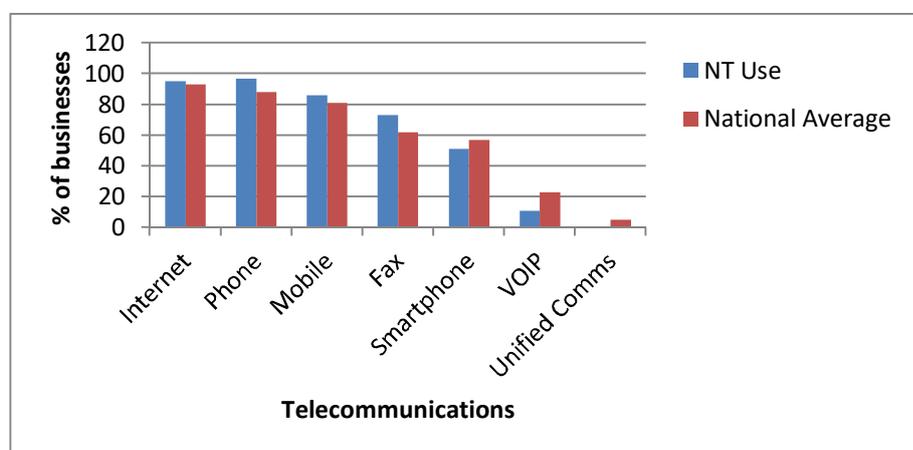


Figure 5.1. Type of telecommunications use by NT Businesses, 2013.
Data source: Digital Business Insights 2014, p15

In the DWAT survey 95% of respondents said they accessed the Internet in their workplace, and of these, 98% used the Internet for business purposes. One participant did not answer this question and two others responded No.^{xiii} Of the remaining 151 respondents who accessed the Internet in the workplace 46.3% worked for a NFP/community group, 35.1% government agency and 17.2% business, with the remainder Not stated or Other.

5.2. Type of connectivity

Most respondents' workplaces used a form of Broadband to access the Internet. However, unlike mainstream Australia where ADSL/ADSL2 or ADSL2+ are in common use, the majority of respondents in the DWAT Survey indicated that they used wireless (24%). This was closely followed by ADSL2 or ADSL2+ (22.7%) (Figure 5.2). Almost 12% used satellite, which is higher than the Digital

^{xiii} Of the No group, one was clearly an input error and should have been a 'yes' because other questions relating to internet usage in the workplace were answered. The other No respondent indicated that although her (government) workplace had Internet access (wireless) and that she used the Internet, she answered all the remaining questions on the survey form on behalf of the Indigenous community in which she worked; from these responses it is inferred that community members did not use the Internet in their workplace(s). Owing to this anomaly, her responses were subsequently excluded from the user sample for the remaining analyses. Only those respondents who indicated that they used the Internet in the workplace are included in the remaining analyses.

Business Insights result for the NT (5%), but not surprising given the proportion of participants in Remote and Very Remote areas. Very few respondents used more than one type of Internet connection.

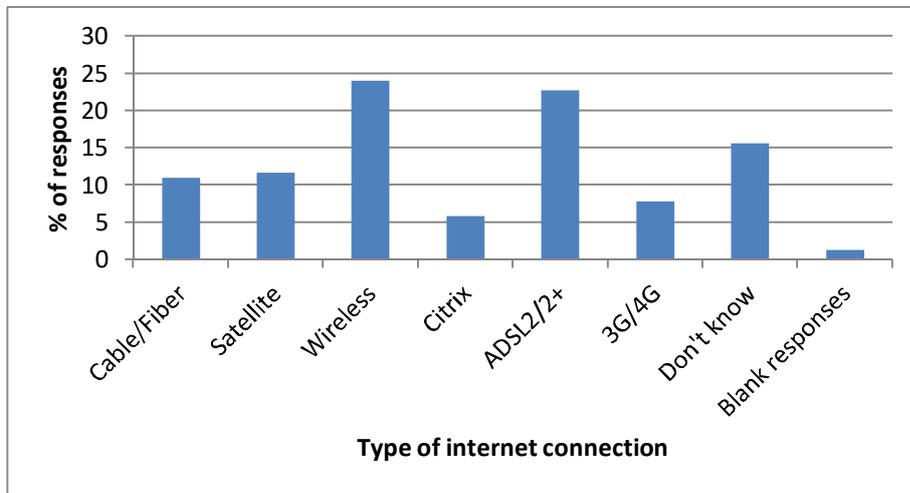


Figure 5.2. Frequency distribution of Internet connectivity types used by participants in the DWAT survey.

Not surprisingly, the DWAT survey found that the majority of respondents in Very Remote areas are reliant on satellite (77.8%). However the range of other connectivity solutions used in Remote and Very Remote areas (Figure 5.3) indicates that backhaul solutions are clearly available in some of these areas and suggests that where such solutions are possible, users are adopting these alternative types of connectivity. This has implications for existing Australian Government and NBN policy that essentially locks in remote users to a single solution i.e. satellite, and is discussed elsewhere in this report.

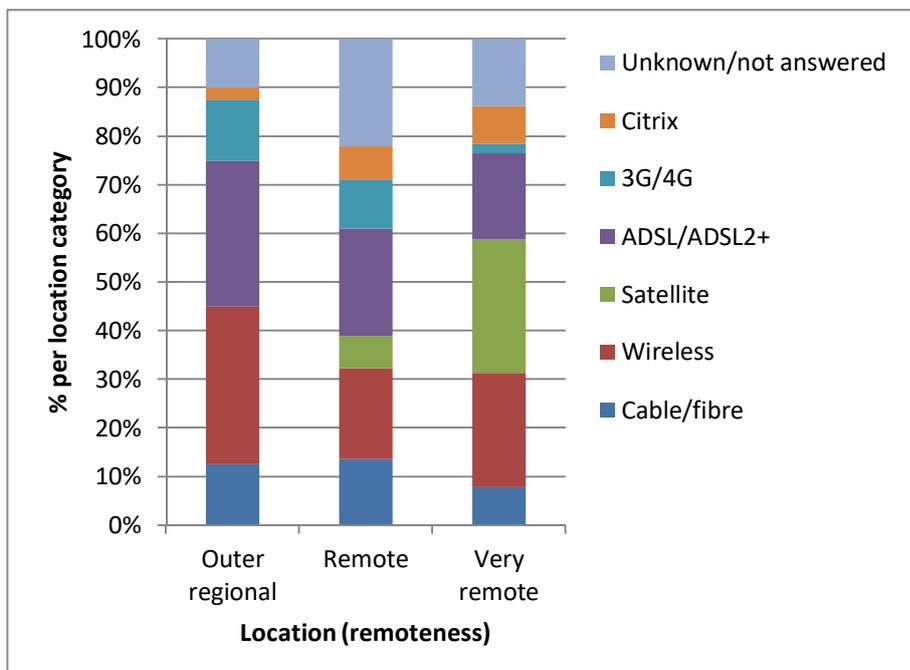


Figure 5.3. Frequency distribution of connectivity types by workplace location (remoteness).

When connectivity type was compared to each respondent’s workplace location at a finer-grained level, it became apparent that respondents situated in the NT’s main urban centres of Darwin-Palmerston, Alice Springs, Katherine and Tennant Creek were more than twice as likely to use ADSL2/2+(28%) compared to those outside of those areas (13.5%). In contrast, the most common type of connectivity in non-urban areas was satellite (32.7%). Wireless was the next most common choice for users in both urban (25%) and non-urban (23.1%) areas (Figure 5.4). Users of the CITRIX system were twice as likely to be located outside of the four main centres. There are greater choices in terms of connectivity if the user is situated in an urban centre or larger community, while outside of these areas (i.e. pastoral stations, small homelands and outstations) there is little choice other than satellite.

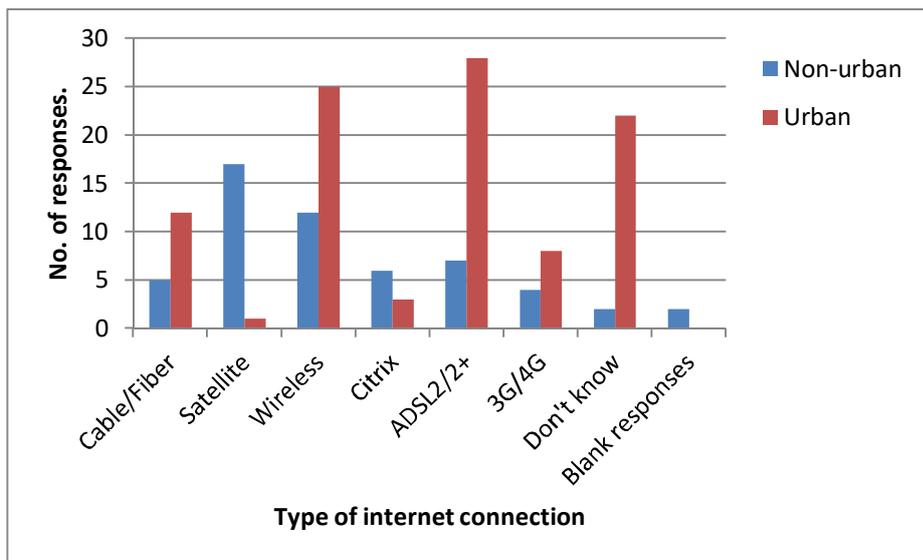


Figure 5.4. Frequency distribution of urban and non-urban participants by connectivity type.

In common with other studies, the DWAT Survey found that a sizeable proportion of respondents did not know what type of Internet connection their workplace had (15.6%). Interestingly, of these, the majority were located in the four main urban centres (91.7%). In contrast, only two respondents located outside the four urban areas did not know what type of connectivity their workplace used.

5.3. Adequacy of existing level of Internet access

Respondents were asked if their level of Internet access enabled them to adequately utilise the applications they used in their workplace (Question 6). About three quarters of respondents (75.5%) answered Yes. Of the 21.9% who responded negatively to this question, speed and reliability were most commonly raised as issues. One wrote that the “Internet is too slow to run some applications” and another that “Internet speeds impede use of multiple forms (email, web, etc) at once” and yet another that “while we get ADSL2 we only get about half ADSL2 speed.” Notably, of these 33 respondents, 42.4% relied on satellite connections compared to 15.1% that relied on wireless and 12.1% on 3G/4G.

When all responses to this question were compared to their type of connectivity, 77.8% of those using satellite indicated that their level of Internet access was inadequate. One participant wrote that:

“Our satellite service is well below a standard where we can use cloud services. We are expected to move to digital record keeping yet our Internet connection means this is borderline impossible due to slow speeds.”

Another noted “On satellite we do not get regular usage. Internet keeps dropping out.” When responses to Question 6 were compared with location it was not surprising that fewer users in Remote and Very Remote workplaces said that they had an adequate level of Internet access to enable them to utilise their applications, compared to those in Outer Regional NT (Figure 5.5). The differences between remoteness categories regarding the proportions of Yes and No responses to this question were highly statistically significant ($\chi^2 = 9.268$, $df=2$, $.01 > p > .001$).

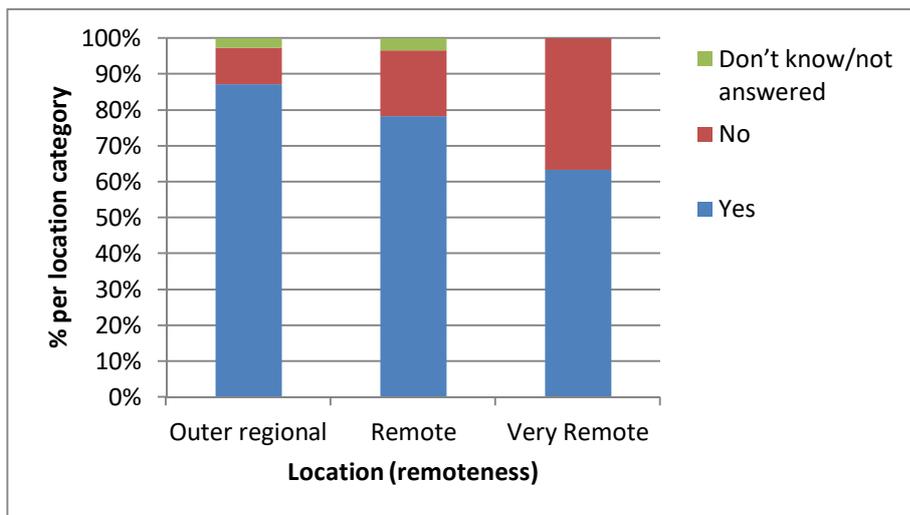


Figure 5.5. Responses to Question 6: “Does your level of Internet access enable you to adequately utilise the applications you use?” by location (remoteness).

Contrary to expectations, there were more respondents in government workplaces (35.8%) who indicated that their level of Internet access was not adequate for the applications they used, compared to those in NFP/community groups (12.6%) or business (19.2%) (Figure 5.6). Of those respondents who indicated that they had an inadequate level of Internet access, over half (57.6%) were from government workplaces (Figure 5.7) and of these 68.4% worked in local government. The differences between workplace types regarding the proportions of Yes and No responses were statistically significant ($\chi^2 = 8.7043$, $df=2$, $.02 > p > .01$).

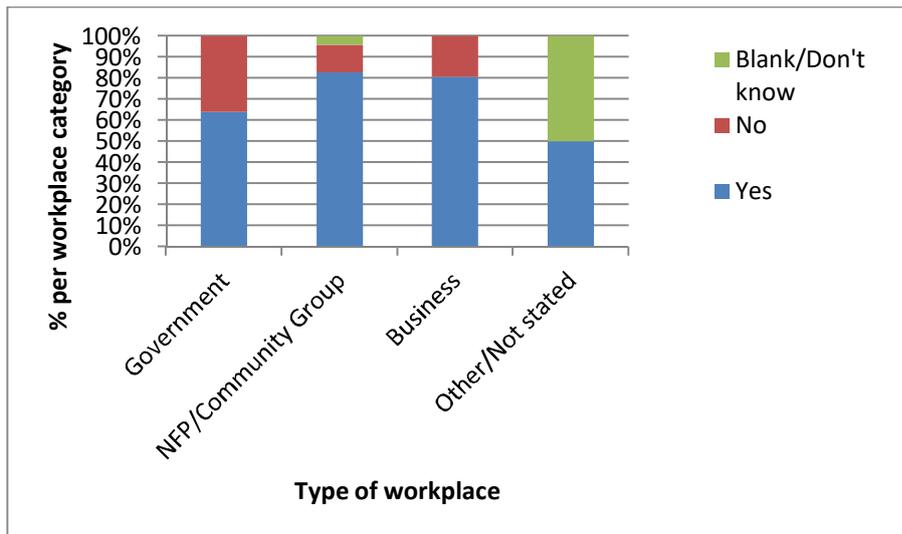


Figure 5.6. Responses to Question 6: “Does your level of Internet access enable you to adequately utilise the applications you use?” by workplace type.

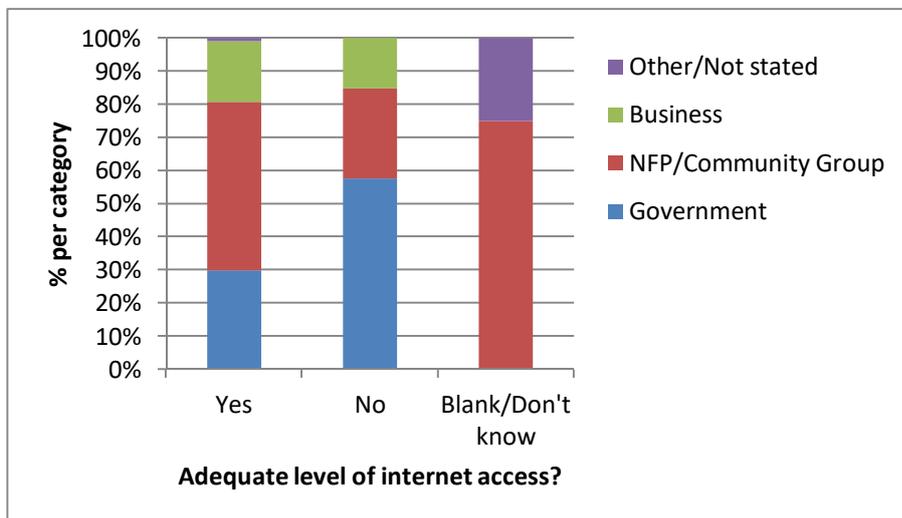


Figure 5.7. Responses to Question 6: “Does your level of Internet access enable you to adequately utilise the application you use?” by workplace type.

Interestingly, among respondents who indicated that they did have an adequate level of Internet access, there were still some (n=7) who commented unfavourably on the speed and/or reliability of their existing Internet connection. One wrote that it was “very slow and frustrating at times” another that “I have had ongoing problems with unpredictable Internet disconnections and times of very slow service. This interferes with being able to utilise certain programs.” These examples serve to highlight Internet speed and reliability of service as important issues for workplaces in the Territory, particularly those who rely on satellite connections or work in local government. Anecdotal evidence suggested that users of the CITRIX system might be amongst those most likely to indicate that their level of Internet access was inadequate for their needs. Although only two CITRIX users indicated that this was the case in the current survey, no significance can be attached to these results owing to the overall small sample of respondents who relied on CITRIX captured in this survey.

In Question 7, respondents were asked if there were applications (such as cloud services or videoconferencing) they would use if they had adequate Internet access in their workplace. Interestingly, this question generated more affirmative responses than expected (n = 100, or 66.2%), given the number of affirmative responses to the previous question. This suggests that although most respondents (75.5%) might have an adequate level of Internet access to enable them to use their existing applications, nonetheless there are additional applications that some of these respondents would like to be able to use (Table 5.1). The additional applications most frequently named in the comments section of the form were videoconferencing, followed by cloud services, although these responses may have been influenced by the questionnaire design. Notably, all but one of the participants with inadequate levels of internet access indicated that there were applications they would like to be able to use.

Table 5.1. Responses to questions relating to adequacy of level of Internet access and potential application usage.

Question	Response			
	Yes	No	Blank/ Don't know	Total
Q 6. Does your level of Internet access enable you to adequately utilise the applications you use?	114	33	4	151
Q 7. Are there applications you would use if there was adequate Internet access? (E.g. cloud services, video conferencing, etc)	100	33	18	151

5.4. Use of mobile technologies and devices

In order to address challenges posed by the NT's particular geography and demography, there was a particular interest in gauging the extent to which workplaces used mobile, as opposed to fixed technologies and devices. Question 8 asked participants whether their workplace used technologies and devices such as mobile phones, tablets and laptops to access and transfer data. In response, 84.8% answered Yes while 12.6% answered No. This high level of mobile device usage is consistent with ACMA's recent 2015 report, which found that mobile phone use is significantly higher in regional areas compared to capital cities.³⁰⁷ In the DWAT Survey, of those respondents whose workplaces used mobile technologies and devices, over half (53.1%) were from NFP/community groups, about 32% were from government agencies and just under 18% were from the business sector.

Amongst those who did not use mobile devices in their workplace to access and transfer data, 47.4% were from workplaces that relied on satellite connectivity to access the Internet, indicating that connectivity plays a major role in the extent to which mobile devices and technologies are used. In contrast, the size of the workplace does not seem to have been a significant factor in terms of mobile technology use in the DWAT Survey, although the influence of the small sample size cannot be entirely excluded. Similarly, no particular industry sector differences were evident. It was observed that amongst those that do not use mobile technologies to access and transfer data, just over half (57.9%) were from Government agencies, however the differences between workplace types regarding the proportions of Yes and No responses, were not statistically significant ($\chi^2=4.0382$, $df=2$, $.2 > p > .1$).

6. Internet use

The DWAT Survey did not ask about general uses of the Internet as it was felt that such questions were unlikely to yield information substantially different from the existing studies described earlier in this report. That body of research found that amongst organisations common uses of the internet were for email, banking, searching, buying-ordering-selling, advertising and so on. Based on previous research, it appears that Territory business use of the Internet for email, banking, searching, buying and ordering activities is below the national average, but above average for recruitment³⁰⁸ (Figure 6.1).

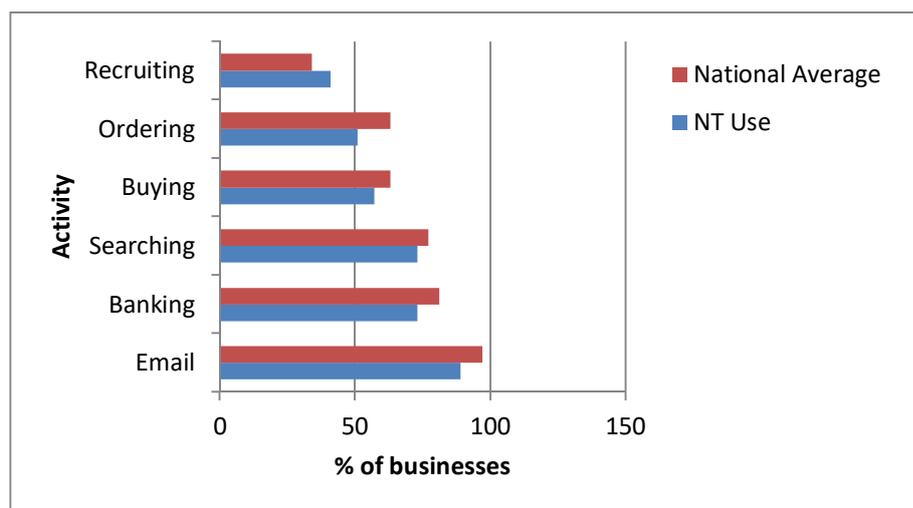


Figure 6.1. Territory business use of the Internet compared to the national average.
Data source: Digital Business Insights 2014, p24

Instead, DWAT survey questions regarding usage focussed on aspects of internet use that had been identified as important elements of the digital transformation of workplaces such as use of cloud computing, teleworking, on-line and digital training, digital strategies and innovation. Questions were also asked around the perceived cost benefits of Internet usage.

Not surprisingly, of all respondents using the Internet in their workplace, all but four indicated that they used Internet-reliant applications such as email, social media, cloud services and video conferencing. Of the four exceptions, two responses were blank and the other two appeared to be input errors on the part of the respondent.

6.1. Cloud computing

In Question 12, respondents were asked if their workplace used cloud technologies for activities such as online accounting or data storage. Just over half (50.3%) answered Yes while 43.7% said No and the remainder did not answer this question. The proportion who indicated that their workplace used cloud technologies is slightly higher than that recorded in previous research undertaken by ACMA.³⁰⁹ One Outer Regional participant stated that “ALL of our application needs are in the cloud” (emphasis in original).

The non-use of cloud technologies does not appear to be associated with the type or size of the workplace, nor type of Internet connectivity. For example, most non-users of cloud technologies rely

on wireless (24.6%) or ADSL2/2+ (23.1%), which reflects the patterning found amongst all Internet users in the DWAT Survey.

The location of non-users of cloud technologies was also examined, with the expectation that non-users would be more likely to be located outside of the main urban areas. This was the not case. Instead, 75% of non-users of cloud technologies are located in the main urban areas. The proportion of users and non-users of cloud technologies according to their remoteness location was also examined and there was virtually no difference between the proportion of users and non-users in Outer Regional areas and Very Remote locations, although in Remote areas there was a higher percentage of users (56.7%) than non-users (38.3%) of cloud computing.

Data in the previous chapter suggested that some participants felt that their level of internet access did not enable them to adequately use existing services or applications. Accordingly, the adequacy of Internet access for non-users of cloud technologies was also considered. Amongst the non-users, 24.6% said their level of Internet access did not enable them to adequately utilise their applications. This suggests that while Internet access is a factor, it is not the main factor limiting the use of cloud technologies.

Previous research elsewhere³¹⁰ has identified key reasons why businesses and NFPs did not utilise cloud services, such as lack of awareness and/or understanding of what comprises cloud computing (e.g. some people may be unaware that Facebook is a cloud-based service), how cloud computing could be used, concerns regarding data security and privacy, and cost. Although respondents in the DWAT Survey were not explicitly asked why they did not use cloud technologies, it is suggested that the reasons are likely to be similar. Expense was a factor for at least one Very Remote participant who commented that “Cloud services are available but costs are prohibitive.”

6.2. Teleworking (working from home)

Question 14 asked whether people in the workplace used ICT to work from home. Just under 71% answered Yes. When considered by type of workplace (Figure 6.2), 75.5% government respondents indicated that their workplace used teleworking, compared to 73.1% business and 67.6% NFP/community group respondents. There were no significant differences between respondents based on remoteness. Respondents from Remote workplaces and Very Remote workplaces were only slightly more likely to telework (70% and 71.1% respectively) than respondents in Outer Regional workplaces (64.1%).

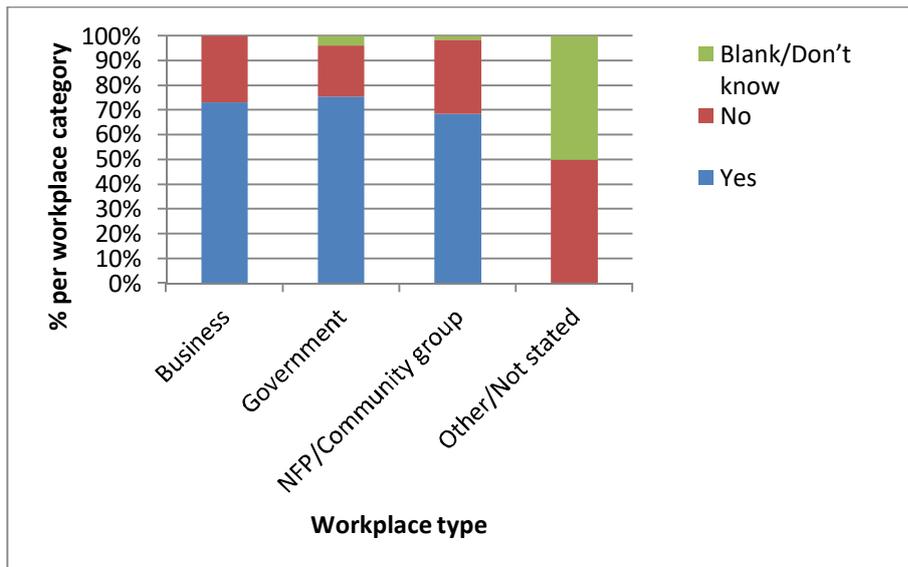


Figure 6.2. Responses to Question 14: “Do people in your workplace use technology to do work from home?” by workplace type.

About a quarter of respondents in the DWAT Survey indicated that their workplace did not undertake teleworking (n=39). When asked why not, 22 responded with varying reasons (Table 4.2), the most common being that it was not applicable (40.9%) as the respondent worked in a home office or for some other reason not stated, followed by lack of need/not required (22.7%) and nature of the sector precluded work from home (18.2%). One participant wrote that their work was “restricted to the workplace” and another that they were “client focused – they come to the workshop.” One Remote user commented that “All work [is] done during office hours in the office.” These results suggest that operational reasons other than technology are the main reasons why some respondents did not telework. There were no statically significant differences between connectivity types regarding the proportions of Yes and No responses to the teleworking question ($\chi^2 = 2.9314$, $df=5$, $p>.5$).

Table 6.1. Reasons why workplace technology was not used to enable people to work from home (Question 14b).

Reason	No.	%
Not applicable (reason N/A not stated)	6	27.3
Not applicable (work in a home office)	3	13.6
No need/not required	5	22.7
Nature of the sector/confidentiality issues	4	18.2
No reception/access	3	13.6
Organisational culture (to maintain work-life balance)	1	4.5
Total	22	100

Considering the top five industry sectors represented in the DWAT survey and those participants whose workplaces did not undertake teleworking, most were based in Health Care and Social Services (33.3%), Arts and Recreation Services (27.3%) and Public Administration and Safety (21.2%). In terms of individual sectors, just over 88% of participants from the Education and Training sector and just over 87% from the Other Services sector, used technology to enable people to work from

home. The differences between the top five industries in the DWAT Survey regarding the proportions of Yes and No responses to this question were significant ($\chi^2 = 11.867$, $df=4$, $.05 > p > .02$). Previous research referred to in Chapter 3 noted that frequently cited benefits of telework included reduction in travel and operational costs. In contrast, the DWAT Survey found no significant associations that suggested that telework was used to reduce operational costs and/or travel. For example, 61% of respondents who indicated that their workplace used technology to work from home also indicated that they used ICT to reduce their operational costs. This was not significantly different from the percentage (58.3%) who said that their workplace did not undertake telework yet still indicated that ICT was used to reduce operational costs. Similarly, 59.4% of respondents who indicated that their workplace undertook telework said that their workplace used applications to reduce travel, compared to 46.1% of respondents who indicated that their workplace did not undertake telework but that their workplace used applications to reduce travel. The differences between workplaces that teleworked and did not telework regarding the proportions that did and did not use ICT to reduce their operational costs were not significant ($\chi^2 = 2.0542$, $df=1$, $.2 > p > .1$).

DWAT survey results suggest that connectivity is less likely to have a greater influence on the decision to use teleworking than the suitability of certain sectors to telework, individual positions, workplace or organisational capacity, and culture. Additional findings regarding costs benefits and travel are presented in section 6.8.

6.3. Online training

In Question 15, respondents were asked if their workplace used online training to up-skill staff. Nearly 58% of respondents said that their workplace offered online training programs. Of these, most (44.8%) worked in government organisations, followed by NFP/community groups (35.6%) and businesses (19.5%) (Figure 6.3). The proportion of government respondents is greater than their proportional representation amongst the sample of Internet users as a whole (Figure 6.4) suggesting that government workplaces are more likely to utilise online training programs than NFP/community group workplaces. In contrast, the proportion of respondents from the business sector is consistent with their proportional representation in the overall sample of Internet users in the DWAT Survey. These differences between workplace types regarding the proportions of Yes and No responses to Question 15 were highly statistically significant ($\chi^2 = 12.9861$, $df=2$, $.01 > p > .001$). The proportion of business respondents who indicated that their workplace undertook online training (19.5%) is lower than that recorded by the ABS for all Australian businesses (31.1%).³¹¹

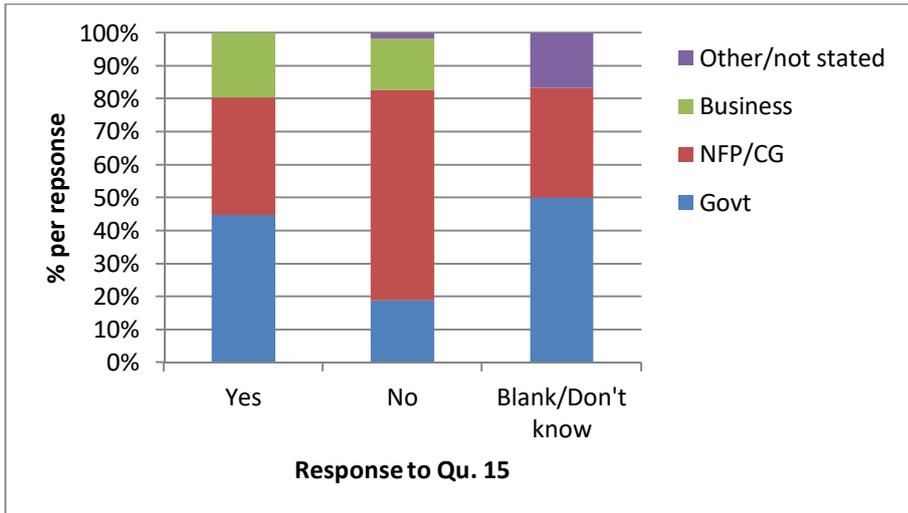


Figure 6.3. Responses to Question 15: “Does your workplace use online training programs to up-skill people?” by workplace type.

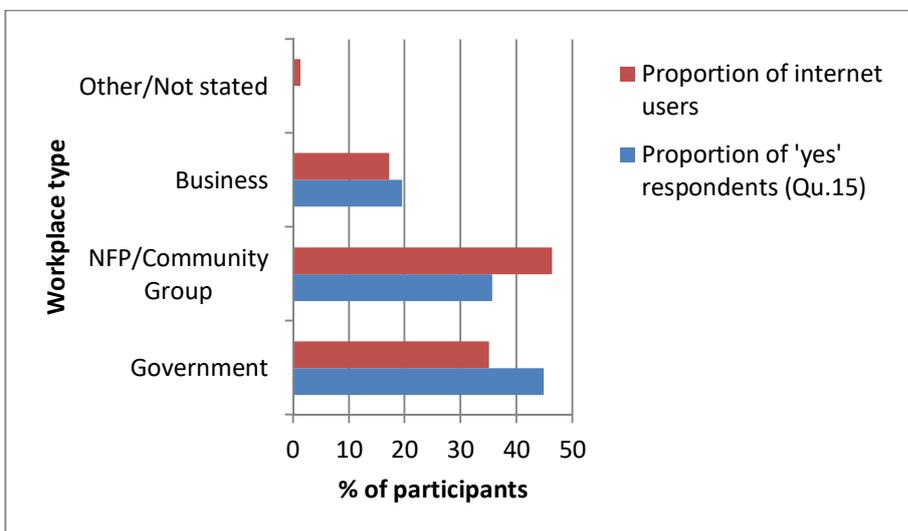


Figure 6.4. Proportion of participants who used online training programs to up-skill people compared to proportions of all Internet users in the DWAT survey, by workplace type.

When considered by remoteness there was very little difference in the proportion of respondents from Outer Regional, Remote and Very Remote areas who indicated that their workplace undertook online training (56.4%, 58.3% and 57.7% respectively). Similarly, connectivity type does not appear to be an influencing factor. One Very Remote government participant commented that “We do online training but not live.” Differences between connectivity types regarding the proportions of Yes and No responses to Question 15 were not statistically significant ($\chi^2 = 4.1226$, $df=5$, $p>.5$).

One issue that was not explored as part of the DWAT Survey, but was raised in a comment by one participant, was the capacity of staff to undertake training online. One Remote user from Alice Springs wrote that “Staff do not have the LLN skills to be trained online.” This serves to highlight that for some Territory workplaces their digital capacity and capability is limited by gaps in basic literacy and numeracy skills that must be overcome before professional skills can be enhanced.

6.4. Digital training

Question 16 asked participants if their workplace undertook about digital training, for example, training in social media, digital marketing or e-commerce. While 58% of respondents indicated that their workplace used online training, Question 16 revealed that only 39.1% undertook digital training and over half (55.6%) did not. This suggests that most digital training does not occur online. Instead, it is likely that digital training occurs in structured learning opportunities outside of the workplace such as workshops and training courses at educational institutions. There were no statistically significant differences between workplace types regarding the proportions of Yes or No respondents to this question ($\chi^2 = 0.34$, $df=2$, $p>.5$). Similarly, there was almost no difference between workplace locations with 38.5% of Outer Regional, 40% of Remote and 38.5% of Very Remote workplaces undertaking digital training.

However, there does appear to be a relationship between online training and digital training. Workplaces that undertook online training were much more likely to also provide digital training whereas those that did not undertake online training were far less likely to undertake digital training. Differences between workplaces that did and did not undertake online training regarding the proportions of Yes and No responses to Question 16 were highly statistically significant ($\chi^2 = 34.289$, $df=1$, $.01>p>.001$).

It should be noted that while less than 50% of participants indicated that their workplace undertook digital training regardless of location or type of workplace, many people may be self-taught or have received training at previous workplaces. Accordingly, the extent to which poor digital literacy is a barrier to ICT adoption and usage in Territory workplaces is not clear since it cannot be assumed that lack of formal digital training equates to poor digital literacy. Participants responses to the DWAT survey questions overall suggest that there are reasonable levels of digital literacy in NT workplaces. Nevertheless, at least one participant expressed the view that “staff need ongoing training to use technology.” Research to determine the common characteristics of successful digital training should include factors such as type, duration, and delivery mode within the context of the individual workplace, number of employees, industry sector, etc.

Interestingly, of those respondents whose workplaces undertook digital training ($n=59$), 78% also had a strategy to increase their digital presence (Question 24) compared to only 36.9% of respondents whose workplaces had not undertaken digital training. Of those respondents whose workplaces did not undertake digital training, 58.3% did not have a digital strategy. The differences between workplaces that did and did not undertake digital training regarding the proportions of respondents who answered Yes and No to Question 24, were highly statistically significant ($\chi^2 = 25.273$, $df=2$, $p<.001$). Clearly there is a strong relationship between these two variables, however whether digital training occurs as part of a digital strategy or whether the digital training is a driver for the development of digital strategies, was not explored as part of the DWAT Survey.

Of the 151 Internet users in the Survey, only 34.4% answered Yes to both training questions and a very similar percentage answered No to both training questions (33.8%). These groups were examined more closely in order to determine what shared workplace characteristics might be found amongst respondents in each of the two groups (Table 6.2). The trends evident in this table are broadly consistent with research elsewhere that has noted that organisation size and capacity

impacts upon the extent to which online or digital training is carried out. For example, resourcing is a particular issue amongst NFPs and in the DWAT Survey there are slightly more NFPs amongst the No group than expected. In contrast, amongst the Yes group there are slightly more respondents from government which may reflect greater capacity to undertake training, including digital training, in this sector. However some caution is required when interpreting these results, as sampling bias cannot be ruled out. The differences between workplace types regarding the proportions of Yes and No responses to these training questions were not statistically significant ($\chi^2 = 4.2427$, $df=2$, $.2 > p > .1$).

Table 6.2. Profile of participants in relation to online training (Question 15) and digital training (Question 16).

Feature	% of participants who answered Yes to Q 15 & 16	% of participants who answered No to Q 15 & 16
Location:		
urban	55.8	66.7
non-urban	44.2	33.3
Outer regional	25.0	25.5
Remote	40.4	41.2
Very remote	34.6	33.3
Workplace type:		
Govt	40.4	21.6
NFP-CP	42.3	58.8
Business	17.3	17.6
Other	0	2
Workplace size:		
0-5 staff	28.8	39.2
6-50	42.3	47.0
51-200	23.1	5.9
over 200	5.8	5.9
1-10	0	2
Top five industries:		
Arts & Recreational Services	7.7	19.6
Education & Training	5.8	15.7
Healthcare & Social Services	15.4	15.7
Other Services	40.4	13.7
Public Administration & Safety	5.8	15.7
Connectivity type:		
ADSL2/2+	17.3	23.5
Cable/Fibre	13.5	9.8
CITRIX	7.7	3.9
3G/4G	13.5	5.9
Satellite	19.2	7.8
Wireless	11.5	33.3
Don't know	17.3	15.7

While it was expected that there would be disproportionately more users answering Yes to both training questions amongst respondents in Remote and Very Remote areas, this was not the case. Similarly, there were no statistically significant differences between workplaces in urban and non-urban areas regarding the proportions of those who answered either Yes, or No, to both training questions ($\chi^2 = 1.2865$, $df=1$, $.5 > p > .2$).

Table 6.2 also shows the top five industry sectors represented in the DWAT Survey. Additional industries were not considered in further detail owing to the small sample sizes. Participants from

the Other Services sector dominated the group that answered Yes to both training questions. There were far fewer respondents than expected from the Education and Training, Public Administration and Safety sectors answering Yes to both questions. This result was all the more surprising given the disproportionate representation of respondents who work in government agencies amongst the Yes group. There were also far fewer respondents from the Arts and Recreation Services industry than expected. It is suggested that this finding reflects resourcing and capacity, particularly in the Arts sector, which historically has been under-funded and even more so in recent times. Given tight budgets this sector may have eschewed training, including digital training, even though at a broader level the Arts and Recreation sector tends to be more digitally savvy in terms of social media and digital engagement. It was beyond the scope of the DWAT Survey to consider these results in further detail but further research should explore the drivers for workplaces in different industry sectors to undertake online training and digital training as differences between the top five industries regarding the proportions of Yes and No responses to both training questions were highly statistically significant ($\chi^2 = 14.1262$, $df=4$, $.01 > p > .001$).

Differences between the Yes and No groups regarding proportions of different connectivity types may be of some statistical significance ($\chi^2 = 10.527$, $df=5$, $.1 > p > .05$). For example, 19.2% of the group that answered Yes to both training questions used satellite compared to 7.8% of the No group. Conversely, 11.5% of the Yes group used wireless compared to 33.3% of the No group. These proportions are not what might be expected if poor connectivity was adversely impacting on the ability of workplaces to undertake online and digital training.

6.5. Use of the Internet for Recruitment

In Question 18 participants were asked whether their workplace used the Internet to assist with recruitment processes. About three quarters of all respondents (75.5%) said Yes, which is not surprising given the remoteness of the Territory. Few comments were provided regarding this aspect of Internet use, however one respondent wrote that they used the job search site, Seek, and advertised through online recruitment sites. One general manager in a Remote workplace commented that they were “starting to use Skype more often when interviewing.” There were more government workplaces than expected using the Internet for recruitment (86.8%) and fewer from business (61.5%). The differences between workplace types regarding the proportions of Yes and No responses to this question were statistically significant ($\chi^2 = 7.7396$, $df=2$, $.05 > p > .02$).

It was anticipated that a greater proportion of respondents who used the Internet for recruitment would be located in Remote and Very Remote areas compared to Outer Regional areas and this was the case (Figure 6.4). However, these differences between remoteness locations regarding the proportions of Yes and No responses were not statistically significant ($\chi^2 = 2.3904$, $df=2$, $.5 > p > .2$).

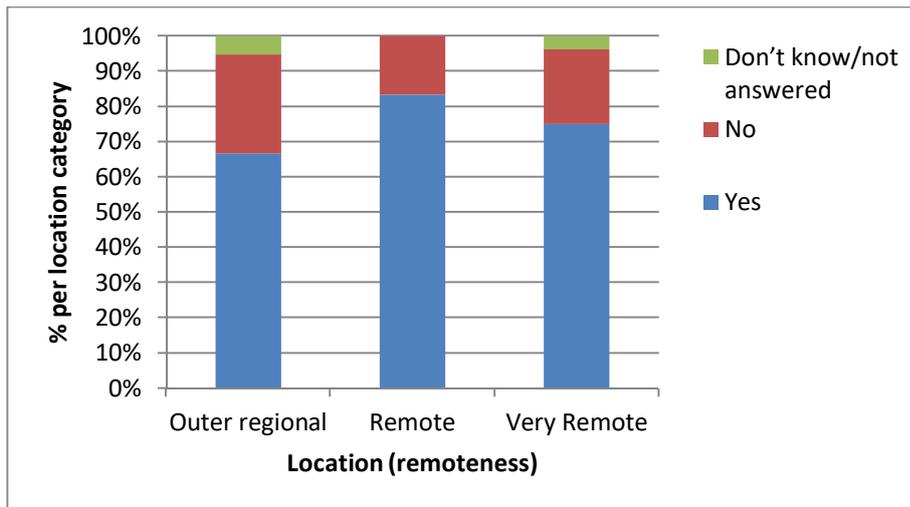


Figure 6.4. Responses to Question 18: “Does your workplace use the Internet to assist with recruitment processes?” by location (remoteness).

No strong patterning was evident when the responses of users in urban and non-urban areas were examined. It was anticipated that a much greater proportion of respondents situated outside of the main urban areas would utilise the Internet as part of their recruitment processes, compared to those situated in one of the four main urban areas, but this does not seem to be the case (Figure 6.5). One explanation for this pattern may be that some workplaces in non-urban areas have a head office in an urban area with all recruitment being undertaken by the head office.

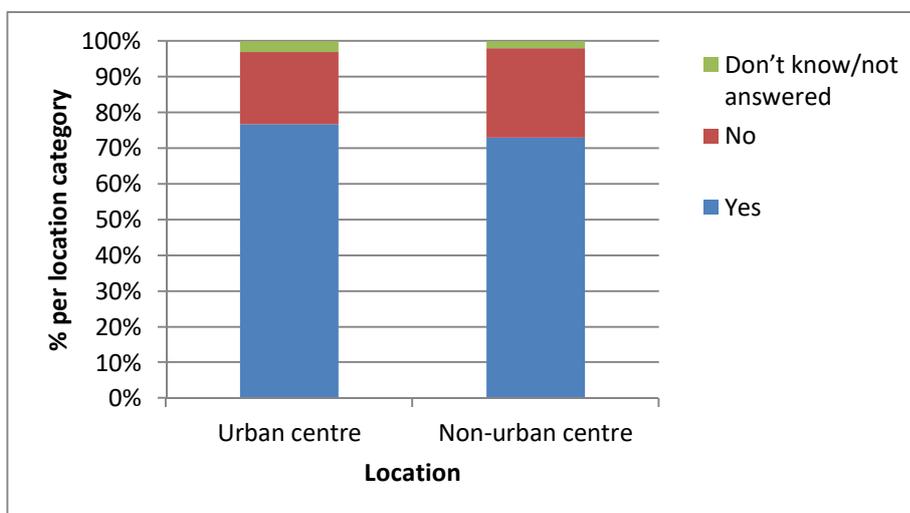


Figure 6.5. Responses to Question 18: “Does your workplace use the Internet to assist with recruitment processes?” by location (urban vs non-urban).

6.6. Reliance on Government websites

In Question 19 participants were asked if their workplace relied on Government websites for up to date information, for example, regarding programs or compliance. Just over three quarters of respondents replied Yes (76.8%) (Figure 6.6). Differences between workplace types regarding the proportions of Yes and No responses were statistically significant ($\chi^2 = 7.6946$, $df=2$, $.05 > p > .02$). For example, a greater than expected proportion of respondents from the NFP/community group and business workplaces answered No to this question, while a greater than expected proportion of

respondents from government workplaces answered Yes. These findings are not surprising when considered in the context of research undertaken elsewhere. Although the DWAT Survey did not ask respondents about specific types of information, nor to rate Government websites compared to other sources of information, other research has indicated that Australian businesses and NFPs generally found government sources amongst the least helpful in terms of providing information about ICT related matters³¹².

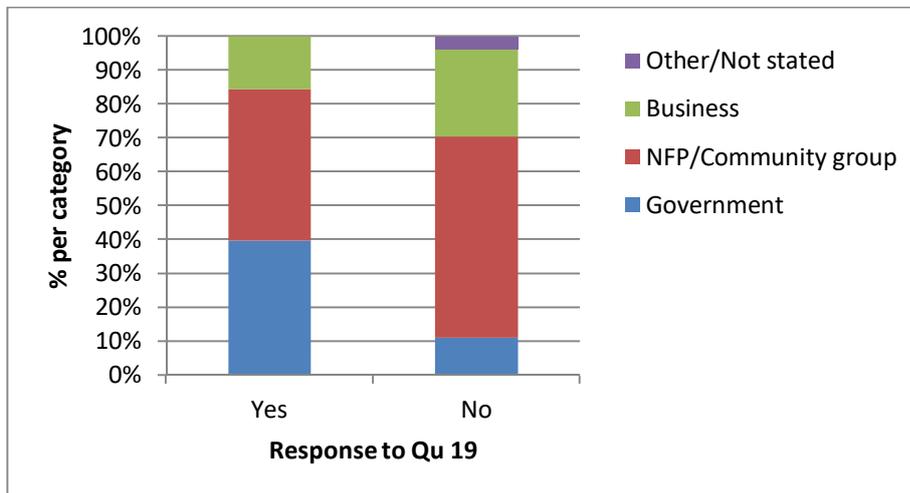


Figure 6.6. Responses to Question 19: “Does your workplace rely on Government websites for up to date information?” by workplace type.

Location also clearly played a role in terms of reliance on government websites as a source of ICT information. While 61.5% of respondents in Outer Regional areas relied on government websites, this figure increased to just over 90% for respondents in Very Remote areas (Figure 6.7). Differences between workplace locations (remoteness) regarding the proportions of Yes and No responses were highly statistically significant ($\chi^2 = 10.1734$, $df=2$, $.01 > p > .001$). These results are not surprising given that respondents situated in Remote and Very Remote areas have less access to and fewer opportunities to gain information from alternative sources such as industry association gatherings, business networks and so on. It is also not surprising given that respondents from government agencies dominated the Remote and Very Remote user groups.

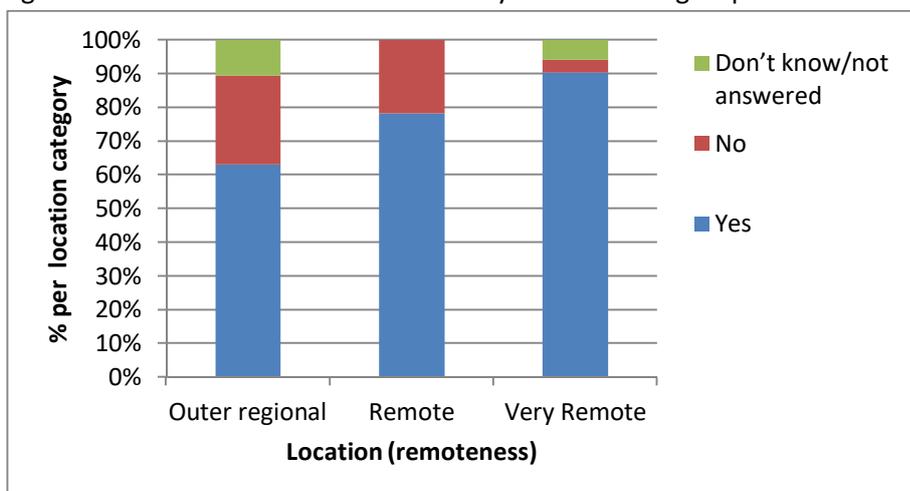


Figure 6.7. Responses to Question 19: “Does your workplace rely on Government websites for up to date information?” by location (remoteness).

6.7 Innovation

Previous research by the Productivity Commission found that there was a positive relationship between ICT and product innovation involving new or substantially changed goods and services.³¹³ Participants in the DWAT Survey were asked if their workplace used technology to identify new markets, services or products (Question 23) and whether or not their workplace actively looked to develop new services that could be delivered online (Question 25). Overall, about two-thirds (66.9%) of respondents said that their workplace used technology to identify new markets, services or products. There were slight differences between workplace types regarding the proportions of Yes and No responses (Figure 6.8), although these were not statistically significant ($\chi^2 = 2.1516$, $df=2$, $.5 > p > .2$).

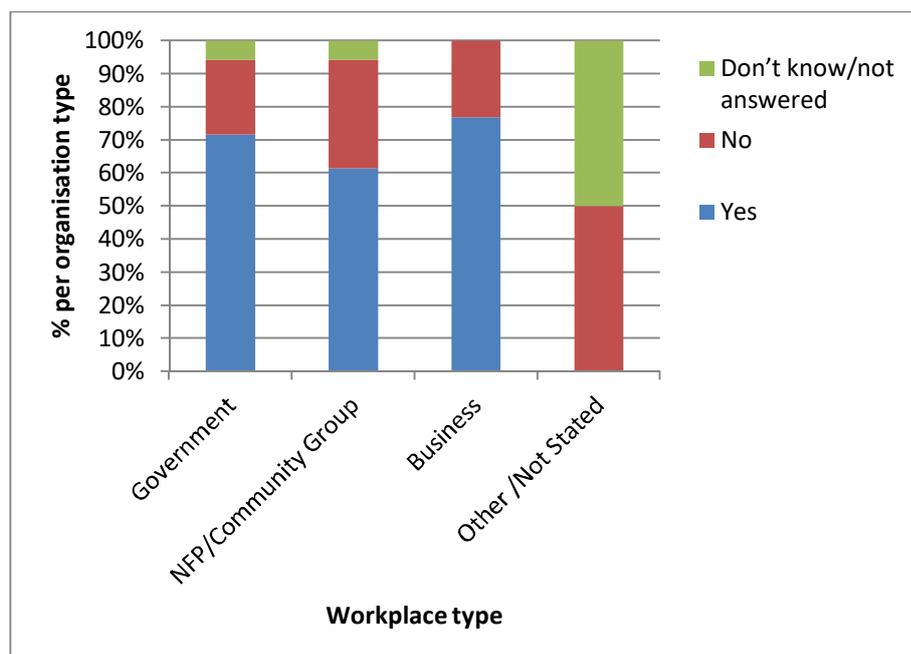


Figure 6.8. Responses to Question 23: “Does your workplace use technology to identify new markets, services or products?” by workplace type.

When responses were considered according to workplace size (number of employees) it was noted that of those who said their workplace did not use technology to identify new markets, products or services, 47.6% had 0-5 employees, which is greater than expected (36.4%), while 38.1% had 6-50 employees, which is less than expected (44.4%). However while these results suggest that workplace size (as a measure of capacity) may be a factor regardless of workplace type, differences between workplaces (based on size) regarding the proportions of Yes and No responses were not statistically significant ($\chi^2 = 4.3321$, $df=3$, $.2 > p > .1$). Likewise, neither connectivity type nor location (Table 4.4) appears to be a factor determining whether or not a workplace used technology to identify new markets, services or products. While the latter may seem surprising, it is less so when considered within the context of a digital economy in which traditional market and geographic barriers may be of less importance.

Table 6.3. Responses to Question 23 regarding using technology to identify new markets, services or products, by location.

Location of participant	Yes (%)	No (%)	Don't know/not answered (%)	Total
Outer regional	66.7	25.6	7.7	100
Remote	70.0	28.3	1.7	100
Very Remote	63.5	28.9	7.6	100
Urban	67.7	27.2	5.1	100
Non-urban	65.4	28.8	5.8	100

It was noted in Chapter 2 that some industries were more likely to be innovative than others in terms of transformation and adaptation to a digital economy. In the DWAT survey most respondents who answered Yes to Question 23 worked in Other Services (24.7%), followed by Arts and Recreation (15.8%), Health Care and Social Services and Public Administration and Safety (12.9% each) and Education and Training (10.9%). In contrast of those who answered No, most worked in Health Care and Social Services (26.2%), Public Administration and Safety (16.7%), Other Services (14.3%), Education and Training (11.9%), Arts and Recreation (9.5%). Small sample sizes for other industries precludes any meaningful statements regarding the extent to which they are innovative, but data for the top five industries suggests that the Other Services and Arts and Recreation industries were more likely to be innovative whereas Health, Public Administration and Education and Training sectors were less likely.

When asked if their workplace actively looked to develop new services that could be delivered online (Question 25), a little more than half (53%) said Yes, while 39.1% of respondents said No, with the remaining responses Unsure or left blank. When the Yes and No responses were compared within workplace type categories (Figure 6.9), it appeared that government and NFP/community group workplaces were more likely to actively look to develop new services that could be delivered online (60.4% and 52.8% respectively), compared to business workplaces (42.3%). These differences between workplace types regarding the proportions of Yes and No responses may be of some statistical significance ($\chi^2 = 4.6178$, $df=2$, $.1 > p > .05$).

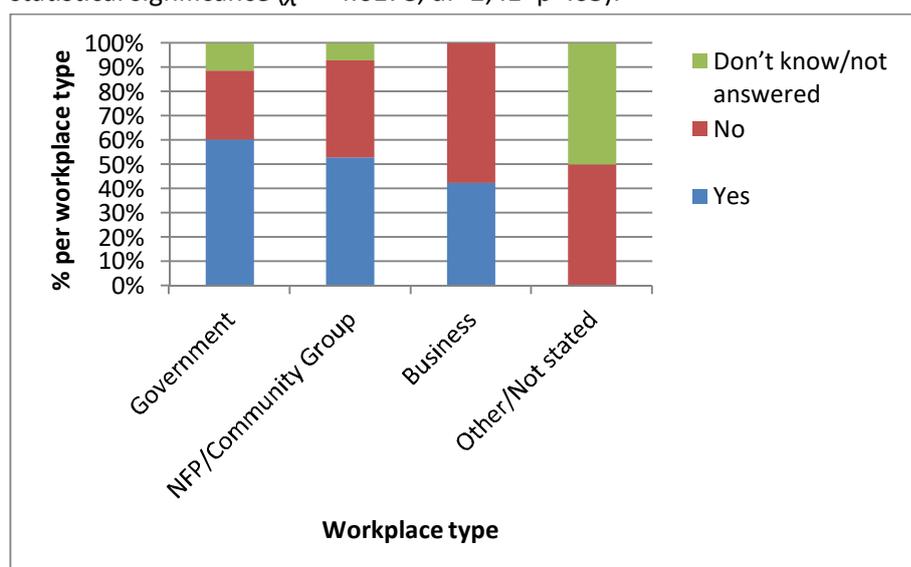


Figure 6.9. Responses to Question 25: “Does your workplace actively look to develop new services that can be delivered online?” by workplace type.

Respondents who answered Yes to Question 23 were more likely to also answer Yes to Question 25 while those who answered No to Question 23 were more likely to also answer No to Question 25. The differences in the proportions of those who said Yes to both questions, No to both questions and those who answered Yes to one question and no to the other, were highly statistically significant ($\chi^2 = 9.393$, $df=1$, $.01 > p > .001$). In Territory workplaces it appears that there is a strong relationship between the use of ICT to identify new markets, services or products and actively developing new services to be delivered online. However, while business and government workplaces were more likely to use technology to identify new markets, services or products than NFP/community groups, businesses were less likely to look to develop new services that could be delivered online than government and NFP/community groups. These results are consistent with a market-driven profit imperative for business organisations, while the emphasis on developing new online services by NFP/community group workplaces is consistent with their service provision role and/or a desire to provide improved services at lower cost.

Location (remoteness) does not appear to be a factor regarding whether or not a participant's workplace actively looked to develop new services that could be delivered online (Table 6.4). The differences between remoteness categories regarding the proportions of Yes and No responses were not statistically significant ($\chi^2 = 0.2771$, $df=2$, $p > .5$). Clearly there are other factors influencing these activities.

Table 6.4. Responses to Question 25 regarding workplaces actively looking to develop new services that could be delivered on online, by location.

Location of participant	Yes (%)	No (%)	Don't know/not answered (%)	Total
Outer regional	51.2	38.5	10.3	100
Remote	58.3	38.3	3.4	100
Very Remote	50.0	40.4	9.6	100
Urban	50.5	40.4	9.1	100
Non-urban	57.7	36.5	5.8	100

For example, it seemed a reasonable expectation that those respondents whose workplaces provided services to rural and remote areas with limited/no telecommunications, would be less likely to develop online services given the limited opportunities their clients would have to access or reliably access those online services. However this was not the case (Figure 6.10).

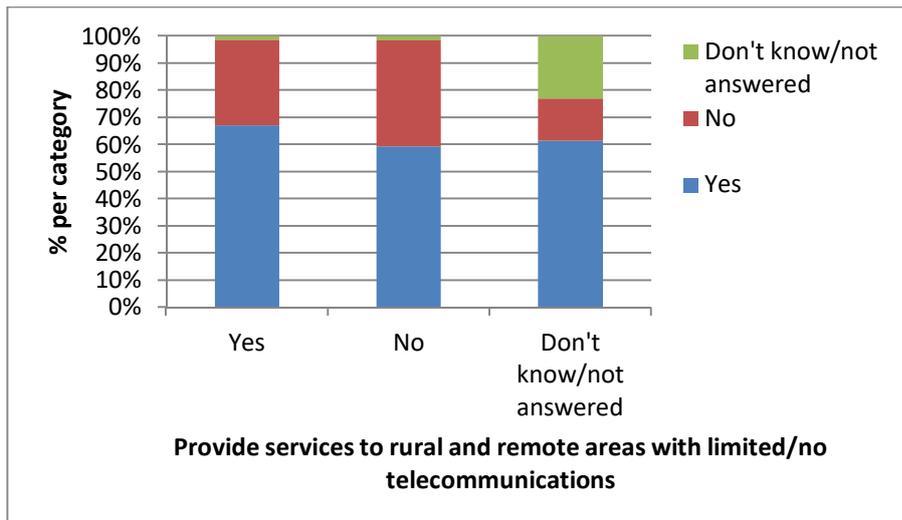


Figure 6.10. Responses to Question 25: “Does your workplace actively look to develop new services that could be delivered online?” by provision of services to rural and remote areas with limited/no telecommunications.

Other reasons that workplaces may develop online services include to: reduce costs; provide more efficient services to online clients; increase competitiveness; or plan for a future when telecommunications for remote clients would improve. Note that connectivity type did not appear to be a factor.

Chapter 3 noted that organisation size plays a role in the extent to which technology is used to develop new products, services and/or markets. In the DWAT survey it was also expected that size would be a factor in the extent to which workplaces looked to develop new services for online delivery. Results shown in Figure 6.11 suggest that in the NT large organisations (200+ staff) are much more likely to develop new services for online delivery compared to micro, small and medium-sized workplaces. While this is consistent with research undertaken elsewhere, our results should nevertheless be treated cautiously owing to the small sample of large organisations in the survey. There was very little variation in the proportion of Yes and No responses from respondents in workplaces with less than 200 employees.

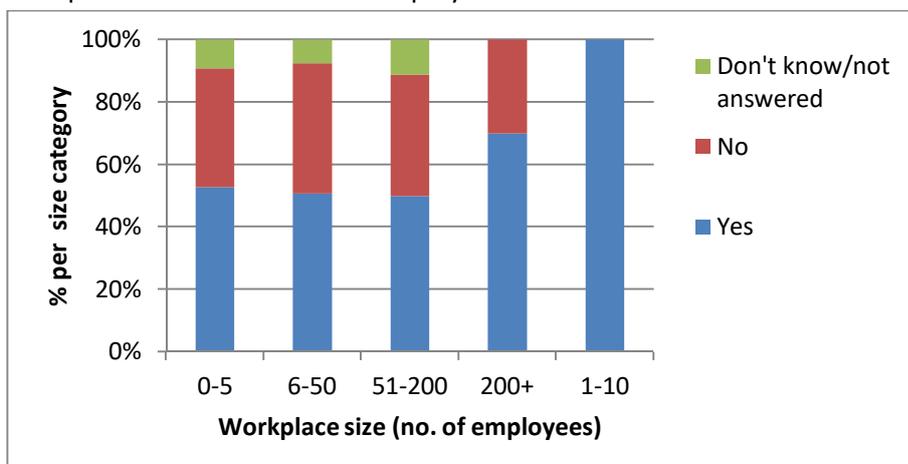


Figure 6.11. Responses to Question 25: “Does your workplace actively look to develop new services that could be delivered online?” by workplace size (number of employees)^{xiv}.

^{xiv} The total population of category 1-10 staff is one; it is included here for the sake of completeness.

Participant’s responses to Question 23, indicated that workplaces in Other Services and Arts and Recreation were more likely to be innovative and use technology to identify new markets, products and services, whereas those in the Health, Public Administration, and Education and Training sectors appeared less likely to do so. It was expected that the responses to Question 25 would result in a similar pattern and this was more or less the case. Workplaces in Other Services and Arts and Recreation were more likely to actively look to develop new services that could be delivered online, along with Public Administration and Safety, while workplaces in the Health and Social Services and Education and Training sectors were less likely (Figure 6.12).

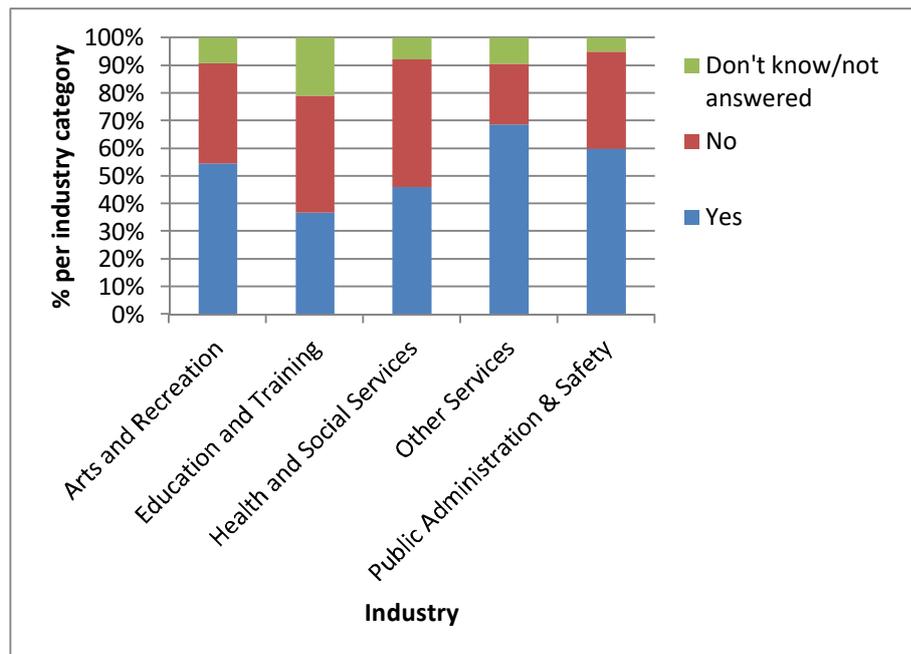


Figure 6.12. Responses to Question 25: “Does your workplace actively look to develop new services that can be delivered online?” by industry for the top five industries in the DWAT survey.

The overall innovativeness of the top five industries in the DWAT Survey was determined by ranking the responses to Questions 23 and 25 according to proportion per industry group that answered in the affirmative to each question. A rank of 1 was awarded to the industry group with the highest proportion that answered in the affirmative and rank of 5 awarded to the industry group with the lowest proportion. These two rankings were then totalled (Table 6.5). Based on this assessment, workplaces in Other Services are the most innovative, followed by Arts and Recreation services and Public Administration and Safety, with Education and Training, and Health and Social Services the least innovative. Small sample sizes precluded applying this approach to any of the other industries represented in the DWAT Survey. However amongst these top five industries there is a positive correlation between workplaces that used technology to identify new markets, services and products and workplaces that actively looked to develop new services for online delivery ($r_s = 0.80, .1 > p > .05$).

Table 6.5. Innovation ranking of the top five industries (by proportional representation) included in the DWAT survey based on proportion that answered Yes to Questions 23 and 25.

Industry	Ranking		
	Q 23. Used technology to identify new markets, services or products?	Q 25. Actively developed new services for online delivery?	Total ranking
Other Services	1	1	2
Arts and Recreation	2	3	5
Public Administration and Safety	3	2	5
Education and Training	4	5	9
Health and Social Services	5	4	9

6.8 Cost benefits

Research cited elsewhere in this report identified cost as both a driver and a barrier to Internet adoption, and cost reduction as a potential adaptive strategy for digital transformation. In addition, there is a widely held belief that the Internet can mitigate or overcome some of the challenges faced in regional areas, including operational costs and cost of travel³¹⁴. The DWAT Survey aimed to assess the extent to which Territory workplaces use of technology had allowed them to reduce their operational costs (Question 9) and if their workplace used applications such as web or videoconferencing, to reduce travel (Question 11).

Use of ICT to reduce operational costs

Of the 151 Internet users, only 55% answered Yes when asked if their workplace use of technology had reduced their operational costs, 35.8% said No and the remainder were unsure or did not answer this question. When the responses were grouped according to type of workplace (Figure 6.13) 69.2% of respondents from business workplaces responded in the affirmative, compared to less than half (47.2%) of the respondents from government, however these differences between workplace types regarding the proportions of Yes and No responses were not statistically significant ($\chi^2 = 1.6529$, $df=2$, $.5 > p > .2$).

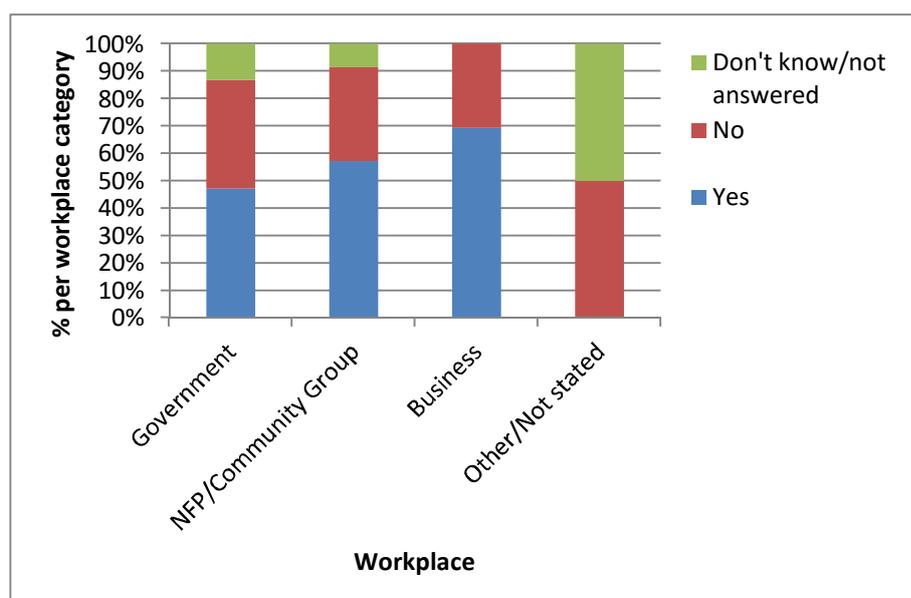


Figure 6.13. Responses to Question 9: "Has the use of technology allowed your workplace to reduce operational costs?" by workplace type.

It was anticipated that a greater proportion of respondents in Remote and Very Remote areas would indicate that ICT had reduced their operational costs than in Outer Regional areas. However as shown in Figure 6.14 this was not the case. These differences between locations (remoteness) regarding the proportions of Yes and No responses may be of some statistical significance ($\chi^2 = 5.534$, $df=2$, $.1 > p > .05$).

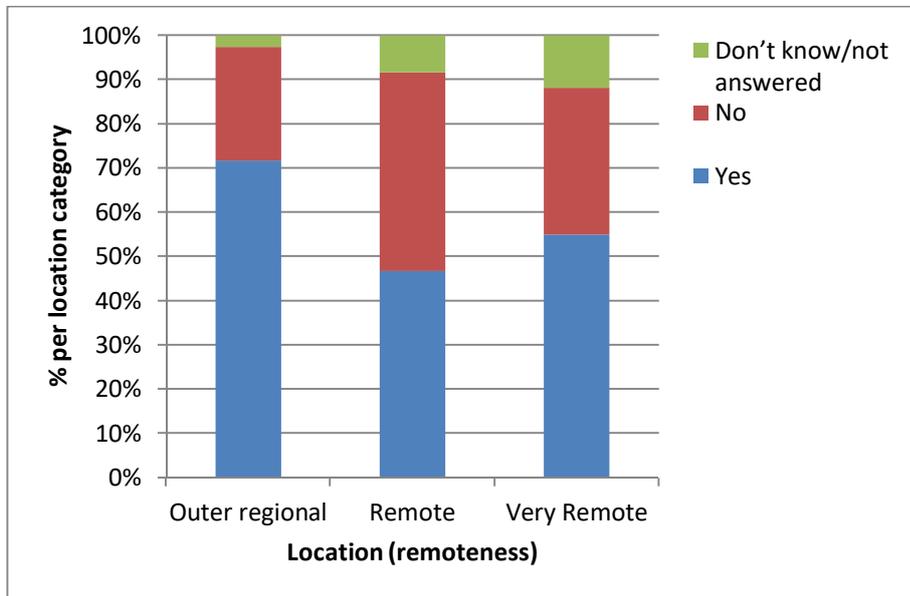


Figure 6.14. Responses to Question 9: “Has the use of technology allowed your workplace to reduce operational costs?” by location (remoteness).

Interestingly, the majority of users of all types of Internet connectivity said that use of technology in their workplace had reduced their operational costs except for those respondents reliant on satellite. The overwhelming majority (66.7%) of satellite users said that use of technology in their workplace had not reduced their operational costs. The differences between connectivity types regarding the proportions of Yes and No responses to Question 9 may be of some statistical significance ($\chi^2 = 11.0399$, $df=5$, $.1 > p > .05$). Given the majority of satellite users are situated outside of the four main urban areas, it may be that other costs such as transport, power, water and so on, are sufficiently high that technology alone cannot offset operational costs. The relatively high cost of satellite services compared to other types of connectivity is also likely to be a factor. These results also go some way towards explaining the patterning shown in Figure 6.14.

It was expected that those workplaces that delivered services to rural or remote areas with limited/no telecommunications might be less able to reduce their operational costs owing to the higher costs associated with service delivery in these areas. However the differences between workplaces that did and did not deliver remote services regarding the proportions of Yes and No responses to Question 9 were not statistically significant ($\chi^2 = 0.2469$, $df=1$, $p > .5$; Table 4.7).

Table 6.6. Responses to Question 9 regarding use of technology to reduce operational costs, by provision of services to rural/remote areas with limited/no telecommunications.

Category	Yes (%)	No (%)	Don't know/not answered (%)	Total
Workplace delivered services to rural/remote areas	57.29	34.37	8.34	100
Workplace did not deliver services to remote areas	53.06	38.78	8.16	100
Don't know/not answered	33.33	33.33	33.33	100

A greater proportion of respondents from large organisations (70%) and medium-large (i.e. 51-200 staff) organisations (72%) said that the use of technology in their workplace had reduced their operational costs, compared to respondents from micro-small (0-5 staff) (49.1%) and small-medium organisations (52.2%). These results are consistent with other research that indicates that generally larger organisations tend to identify greater cost benefits from ICT adoption than smaller organisations, in part owing to economies of scale.

Of the top five industries represented in the DWAT Survey, 65% of participants based in the Public Administration and Safety sector responded in the affirmative, in contrast to only 42.1% of those from the Education and Training sector (Figure 6.15). Overall, the majority of respondents in all but two sectors indicated that technology in their workplace had reduced their operational costs. Respondents from the Education and Training sector were evenly split between Yes and No, and the majority of respondents from the Professional, Scientific and Technical Services^{xv} sector (63.6%) answered No.

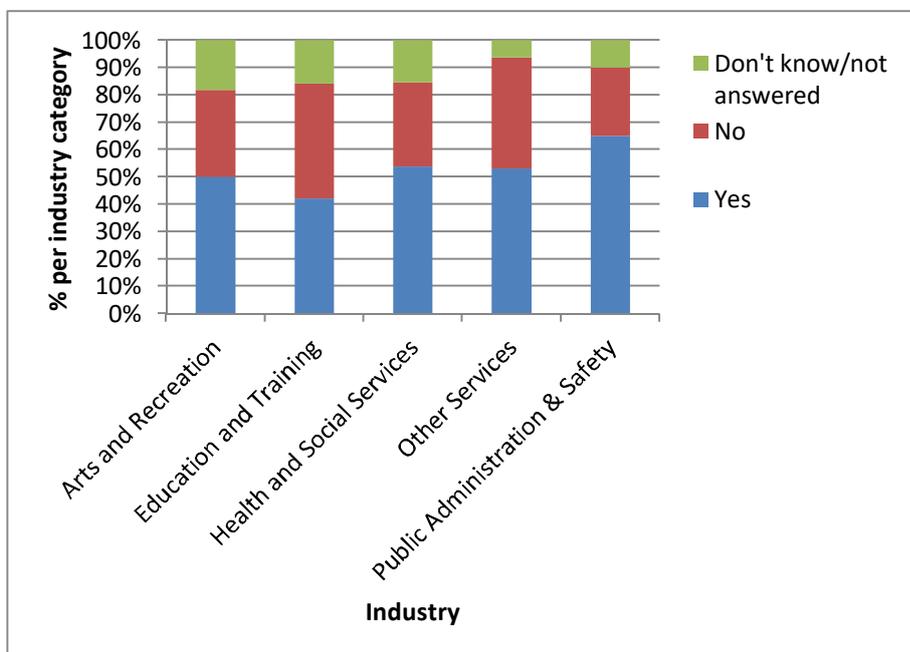


Figure 6.15. Responses to Question 9: “Has the use of technology allowed your workplace to reduce operational costs?” by industry for the top five industries in the DWAT survey.

Of those respondents who indicated that use of technology in their workplace had reduced operational costs (n=83), most did not respond to Question 9b, an optional question, which asked respondents to provide an estimate (as a percentage of savings) of their cost reduction. However estimates that were provided, ranged from 2% up to 80% with the median around 15%. One Remote user commented that “Virtual based admin reduces costs by 50 percent.”

^{xv} The overall small sample size of this sector (n=11) should be noted.

Use of applications to reduce travel

There is a strong perception that use of ICT can reduce travel, which can be a substantial expense in Remote and Very Remote areas. Question 11 of the DWAT Survey asked respondents if their workplace used applications, such as web and videoconferencing, to reduce travel. Overall, 55% of respondents said Yes. Although the business sector seemed to make greater use of these applications to reduce travel compared to other sectors (Figure 6.16), differences between workplace types regarding the proportions of Yes and No responses were not statistically significant ($\chi^2 = 1.0241$, $df=2$, $p>.5$).

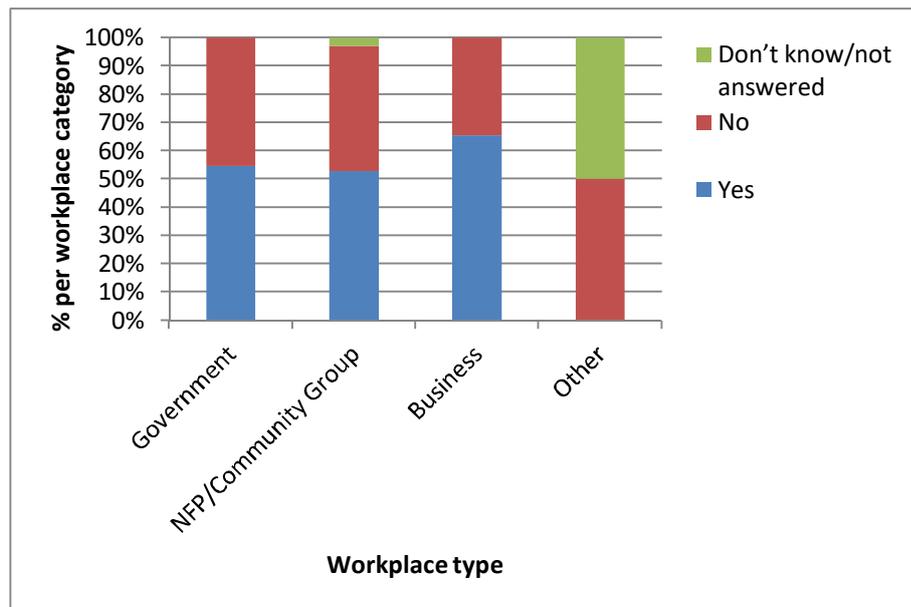


Figure 6.16. Responses to Question 11: “Does your workplace use applications (such as web and video conferencing) to reduce travel?” by workplace type.

Responses according to workplace location (remoteness) were examined (Figure 6.17) but differences between remoteness categories regarding proportions of Yes and No responses were not statistically significant ($\chi^2 = 1.0506$, $df=2$, $p>.5$). However, highly significant statistical differences emerged at a more fine-grained level, when differences between urban and non-urban locations regarding the proportions of Yes and No responses were considered ($\chi^2 = 8.9833$, $df=1$, $.01 > p > .001$). While the majority of respondents in urban areas (63.6%) said that they used applications to reduce their travel, the majority of respondents in non-urban areas (59.6%) said they did not. The majority of respondents in non-urban areas (57.7%) cited lack of reliable connectivity as the reason they did not use applications to reduce travel costs. Only two individuals cited No need/lack of applicability as the reason. In contrast, most respondents in urban areas (41.2%) said there was no need. Despite being situated in urban areas, just under a quarter (23.5%) cited unreliable connectivity but whether this referred to their clients’ unreliable connectivity or their own is unclear.

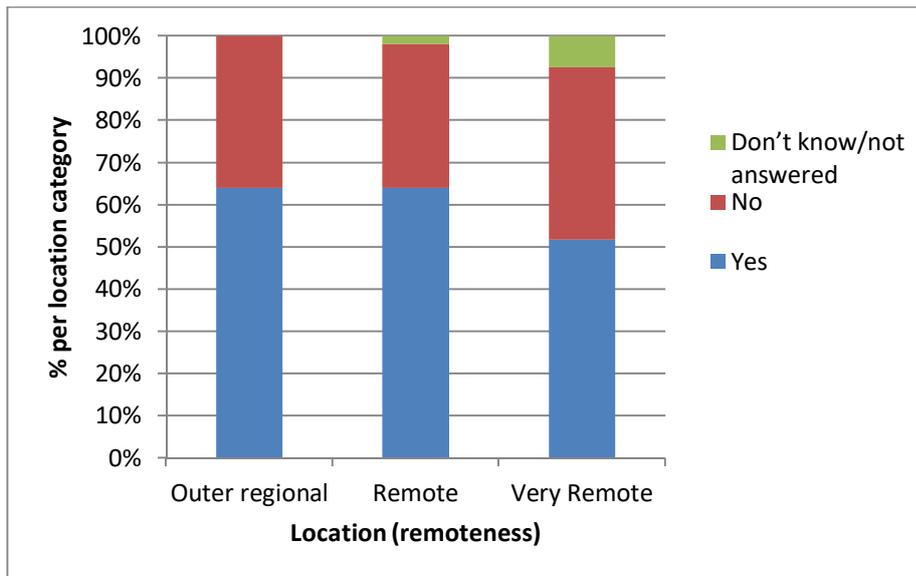


Figure 6.17. Responses to Question 11: “Does your workplace use applications (such as web and video conferencing) to reduce travel?” by location (remoteness).

Responses to Question 11 were also grouped according to whether or not the workplace delivered services to rural and remote areas with limited/no telecommunications (Table 6.7). It was anticipated that respondents whose workplaces delivered services to these areas would be less likely to be able to use applications to reduce travel, but this was not the case. The differences between workplaces according to whether or not they delivered services to remote areas regarding the proportions of Yes and No responses to this question were not statistically significant ($\chi^2 = 0.3929$, $df=1$, $p>.5$).

Table 6.7. Responses to Question 11 regarding use of applications to reduce travel, by provision of services to rural/remote areas with limited/no telecommunications.

Category	Yes (%)	No (%)	Don't know/not answered (%)	Total
Workplace delivers services to rural/remote areas	56.25	41.67	2.08	100
Workplace does not deliver services to remote areas	52.00	48.00	0	100
Don't know/not answered	60.00	20.00	20.00	100

All participants answering No to Question 11 were asked why they did not use applications to reduce their travel, regardless of their workplace location. The most commonly cited reason was lack of reliable connectivity (41.9%), followed by no need or lack of applicability (23.2%) and slow service (speed) (9.3%) (Table 6.8). Apart from one participant who identified cost as a factor, another who referred to a “lack of policies, procedures and resources”, and another who said it was “not advanced”, all the others identified a lack of appropriate infrastructure/technology.

When responses to Question 11 were compared to connectivity type, it appeared that connectivity was the major issue. 88% of respondents reliant on satellite said they did not use applications such as the web and video conferencing to reduce their travel, compared to 58.8% of those on ADSL2/2+ and 54% using wireless who said they did. The differences between connectivity types regarding proportions of Yes and No responses to this question were highly statistically significant ($\chi^2 = 15.4512$, $df=5$, $.01>p>.001$).

Table 6.8. Reasons why some participants did not use applications to reduce their travel.

Reason	% of participants who answered Q 11b
Lack of reliable connectivity/service	41.9
Not required/no real need/not applicable	23.2
Service too slow	9.3
Lack of videoconferencing facilities	4.6
"Internet not good enough"	4.6
Lack of technology	4.6
No service	2.3
Lack of bandwidth	2.3
Lack of infrastructure	2.3
"Teleconference is fine"	2.3
Lack of policies, procedures and resources	2.3
Cost	2.3
"Not advanced"	2.3

Although it was beyond the scope of the current study to explore the relationship between technology and travel in greater depth, it is possible that an additional reason why some participants did not use applications to reduce their travel, related to the motivation for travel. Research elsewhere has found that the availability of Home Internet did not significantly reduce travel by Remote and Very Remote Indigenous residents because people travelled for multiple reasons that could not all be met simply by accessing the Internet.³¹⁵ This is consistent with a growing number of studies, which challenge the conventional views firstly, that travel is a disutility to be minimised, and secondly that use of ICT reduces travel.³¹⁶ Research by Nobis and Lenz,³¹⁷ and Dal Fiore and others³¹⁸ have shown that technologies such as mobile technology may actually increase travel or "digital nomadism" by providing people with new reasons to travel.³¹⁹ In addition to cost considerations, the ability to fulfil multiple activities at the real (as opposed to virtual) location, for example by linking recreational/social activities to a business trip, as well as the quality of the experience at the destination end-point also influence the decision whether or not to travel³²⁰.

Other research has demonstrated a strong correlation between mobile phone use and travel behaviour, i.e. amongst people who have a high level of mobile phone use, frequency of travel declined less or even increased compared to all other people.³²¹ Although the DWAT Survey did not specifically investigate levels of mobile use and travel frequency, a comparison of the responses to Question 11 and Question 8, which asked about workplace use of mobile technologies to access and transfer data, suggests there is a significant relationship between the two. For example, 52% of respondents answered Yes to both Questions 11 and 8, compared to 34% who indicated that their workplace used mobile technologies and devices, but did not use applications to reduce their travel and 3.4% who indicated that their workplace did not use mobile technologies but did use applications to reduce their travel. The differences between workplaces that did and did not use applications to reduce their travel regarding the proportions of Yes and No responses to Question 8, were statistically significant ($\chi^2 = 8.7104$, $df=1$, $.01 > p > .001$). It was beyond the scope of our study to further investigate the nature of this relationship between mobile phone use and travel behaviour but this is an area worthy of further investigation given the high levels of mobile technology and device use (>86%) in Territory workplaces and increasing demand for mobile coverage.

In terms of workplace size (number of employees) 80% of respondents from large organisations, 58.2% from workplaces with no more than five staff, and around 50% of respondents from small-medium and medium-sized workplaces, said that their workplace used applications to reduce their travel. Although our sample size of large organisations was small, these results are consistent with research elsewhere indicating that larger organisations have a greater capacity to use ICT to reduce their costs than SMEs.³²²

At least 50% of participants from three of the top five industries in the DWAT Survey, indicated that their workplace used applications such as web or videoconferencing to reduce travel (Figure 6.18). Respondents from the Public Administration and Safety sector were most likely to use applications to reduce travel (85%), followed by those in Education and Training (68.4%) and Healthcare and Social Services (61.5%). In contrast only 31.2% of respondents from workplaces in the Other Services sector answered Yes. Given that this sector has tended to be one of the more innovative industries in terms of their Internet use, this result was initially surprising until some potential reasons were considered. Just under two-thirds of respondents in this sector who said that they did not use applications to reduce travel, cited unreliable connectivity as the reason. The differences between the top five industries regarding the proportions of Yes and No responses to Question 11 were highly statistically significant ($\chi^2 = 17.692$, $df=4$, $.01 > p > .001$).

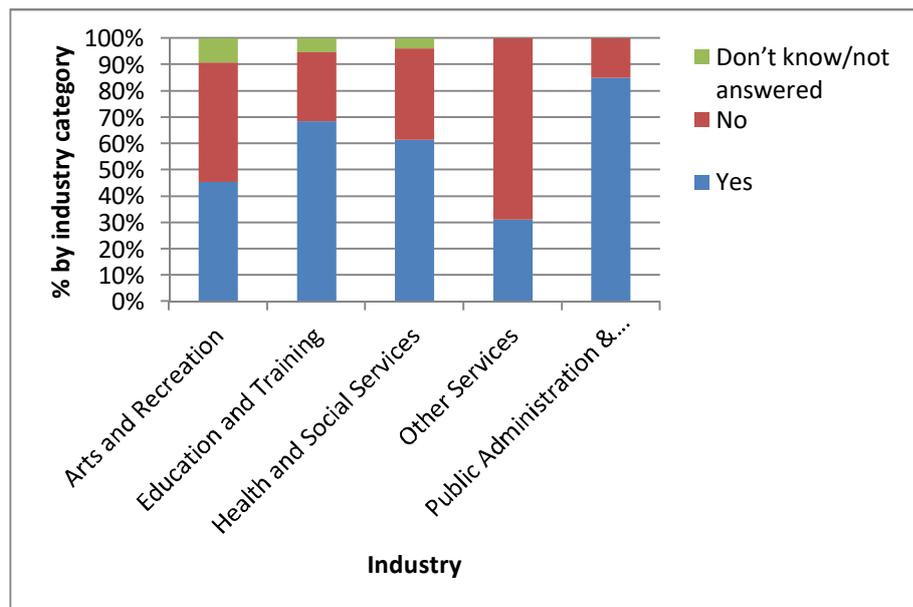


Figure 6.18. Responses to Question 11: “Does your workplace use applications to reduce travel such as web and videoconferencing?” by industry for the top five industries in the DWAT survey.

The overall extent to which respondents used the Internet to reduce costs was measured by the number of respondents who answered Yes and No to both Questions 9 and 11 (35.1% and 19.2% respectively). Respondents who answered No to both questions (i.e. did not use the Internet to reduce costs) tended to be from smaller government agencies in either urban or non-urban areas, providing Other Services and relying on satellite connectivity (Table 6.9). In contrast, respondents who answered Yes to both questions tended to be from small NFPs based in urban areas using wireless Internet, engaged in Public Administration and Safety, Health, and Other Services.

Other differences between these two groups were also apparent. For example, respondents from business workplaces comprised less than 7% of the No group, but accounted for just over 20% of the Yes group, and while there was only one participant from a workplace with over 200 employees in the No group, respondents from large organisations comprised 11.3% of the Yes group. Notably nearly 38% of respondents in the No group relied on satellite connectivity compared to less than 2% of respondents in the Yes group. Whilst interesting, these findings may reflect sample size biases rather than actual trends. Further research with a larger sample population is required.

Table 6.9. Characteristics of participants who answered Yes or No to both Questions 9 and 11.

Feature	% of participants who answered Yes to Q 9 and Q 11	% of participants who answered No to Q 9 and Q 11
Location:		
urban	69.81	48.27
non-urban	30.19	51.73
Outer regional	35.85	24.14
Remote	28.30	37.93
Very remote	35.85	37.93
Workplace type:		
Govt	33.96	51.73
NFP-CP	45.28	37.93
Business	20.75	6.89
Other	0	3.45
Workplace size:		
0-5 staff	32.07	27.59
6-50	41.51	58.62
51-200	13.21	10.35
over 200	11.32	3.45
1-10	1.89	0
Top five industries:		
Arts and Recreational Services	9.43	10.34
Education and Training	11.32	13.79
Healthcare & Social Services	15.09	6.90
Other Services	15.09	41.38
Public Administration and Safety	24.53	6.90
Services to remote areas:		
Yes	69.81	65.51
No	26.41	31.03
Did not answer question	3.77	3.45
Connectivity (participants may use more than one type):		
ADSL2/2+	22.64	10.34
Cable/Fiber	13.21	10.34
CITRIX	5.66	0
3G/4G	11.32	3.45
Satellite	1.89	37.93
Wireless	26.41	27.59
Don't know	1.89	10.34

6.9. Optimising use of the Internet

Only 25 respondents (16.5%) answered Yes to all four Questions 9 and 11 (use of the Internet to reduce costs) and Questions 15 and 16 (online and digital training). While no clear patterning could be discerned regarding workplace size or industry, there was a tendency for respondents who answered Yes to all four of these questions to come from the NFP sector (52%), be situated in urban areas (68%) and providing services to remote areas (64%). There was no clear trend towards one

particular type of connectivity although only one participant in this group relied on satellite. No clear patterning was apparent at the broader level of location by remoteness owing to the small sample size. Similarly, no clear patterning was obvious in terms of organisation size or industry.

Just under 12% of respondents (n=18) answered Yes to Questions 9 and 11 (reducing costs and travel), 15 and 16 (training) as well as 23 and 25 (innovative use). Of these 55.5% were from the NFP sector, situated in urban areas (66.7%) and providing services to remote areas (72.2%). No particular type of connectivity dominated this group, however it was observed that none of these 18 respondents relied on satellite. Only 4.6% respondents (n=7) answered No to all six questions 9, 11, 15, 16, 23 and 25. The small sample size precludes any meaningful conclusions but it is worth noting that there was no clear bias towards any particular workplace type, size, industry, location, type of connectivity or provision of services to remote areas with limited telecommunications.

Although not conclusive, these results suggest that NFP/community groups are more likely to optimise their Internet use than government or business workplaces, using it to deliver training online and undertake digital training, and identify and develop new services, including online services. These results also suggest that satellite connectivity is a key barrier preventing or restricting the extent to which workplaces can optimise their Internet use.

6.10. Use of digital communications and collaboration tools

The DWAT Survey did not ask any specific questions around respondents’ use of communications or collaboration tools such as social media, Skype and so on. However the Digital Business Insights 2014 survey indicated that NT business use of Facebook, email news, Skype, Chat and Podcasts was above the national average for each of these categories, and below the national average for LinkedIn, Twitter, YouTube and Blogs³²³ (Figure 6.19).

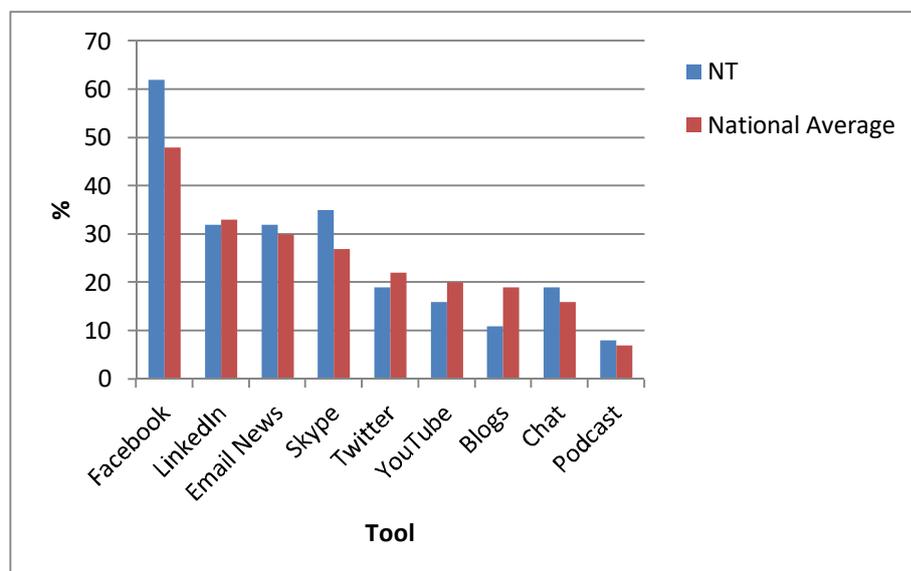


Figure 6.19. Use of digital communications and collaboration tools by NT businesses compared to the national average.
Data source: Digital Business Insights 2014, p25.

7. ICT management

A series of questions were asked around the management of ICT in Territory workplaces, including the internal ability to manage digital aspects of the business; policies and procedures in place for staff working online; compliance with legislation and data standards; and cyber-security. These aspects of ICT adoption and usage also are important in terms of capacity to adapt to a digital economy.

7.1. Regular updating of online resources

Question 13 asked participants whether their workplace's online resources, i.e. website or Facebook page, were regularly updated. Overall, 68.9% said Yes and 25.8% said No, with the rest Not sure or no response. Respondents from government workplaces dominated the No group, accounting for 53.8% of this category. In terms of workplace type, while 81.4% of respondents from NFP/community group workplaces said they regularly updated their online resources, only about half of the respondents from government workplaces said that their online resources were regularly updated (Figure 7.1). These differences between workplace types regarding the proportions of Yes and No responses were highly statistically significant ($\chi^2 = 10.7644$, $df=2$, $.01 > p > .001$).

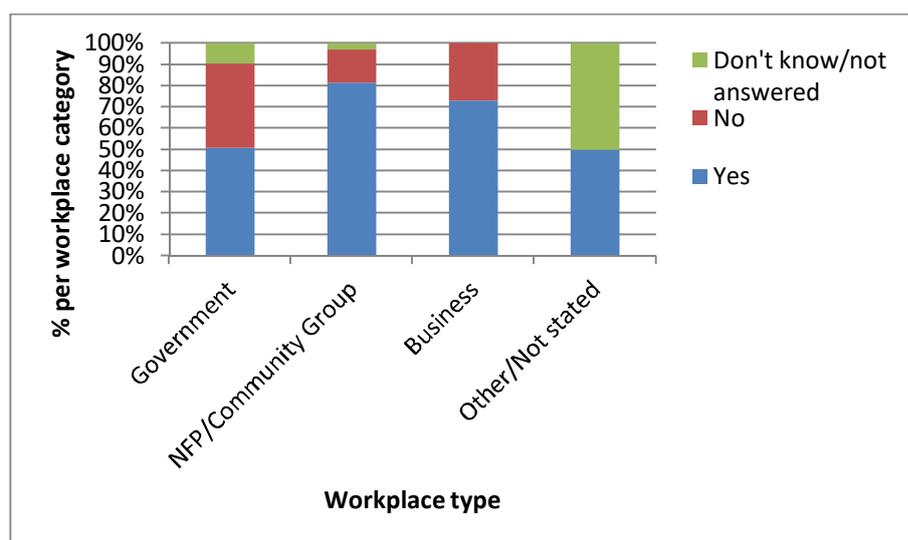


Figure 7.1. Responses to Question 13: "Are your online resources regularly updated?" by workplace type.

In terms of location, workplaces in Outer Regional and Remote areas were more likely to regularly update their online resources (74.3% and 68.3% respectively) compared to those in Very Remote areas (25%). These differences between locations (remoteness) regarding the proportions of Yes and No responses were highly statistically significant ($\chi^2 = 27.8419$, $df=2$, $p < .001$).

At a more fine-grained level some respondents in non-urban areas whose workplace did not regularly update their online resources provided reasons, including: updates being undertaken by their head office/parent organisation; lack of available staff/specialists with the necessary skills; and lack of a website and/or Facebook page. One respondent indicated that they did not have a Facebook page because they would not be able to find the necessary time to maintain and update it. Another wrote that "it is very difficult to get approval to update our website." Notably, poor connectivity was not identified as a reason why a workplace's online resources weren't regularly

updated. It would seem that organisational capacity has a great impact on the extent to which organisations manage their ICT, including maintaining and updating their online resources. Larger organisations have a greater capacity to undertake this type of activity through employing more and/or specialist staff, compared to micro and small organisations, however in the DWAT Survey differences between workplace sizes (number of employees) regarding the proportions of Yes and No responses to this question were not statistically significant ($\chi^2 = 3.7244$, $df=3$, $.5 > p > .2$).

Of the top five industries represented, the Health sector (73%) and Arts and Recreation (72.7%) were more likely to regularly update their online resources, compared to those in Public Administration and Safety (60%) and Education and Training sectors (57.9%) (Figure 7.2).

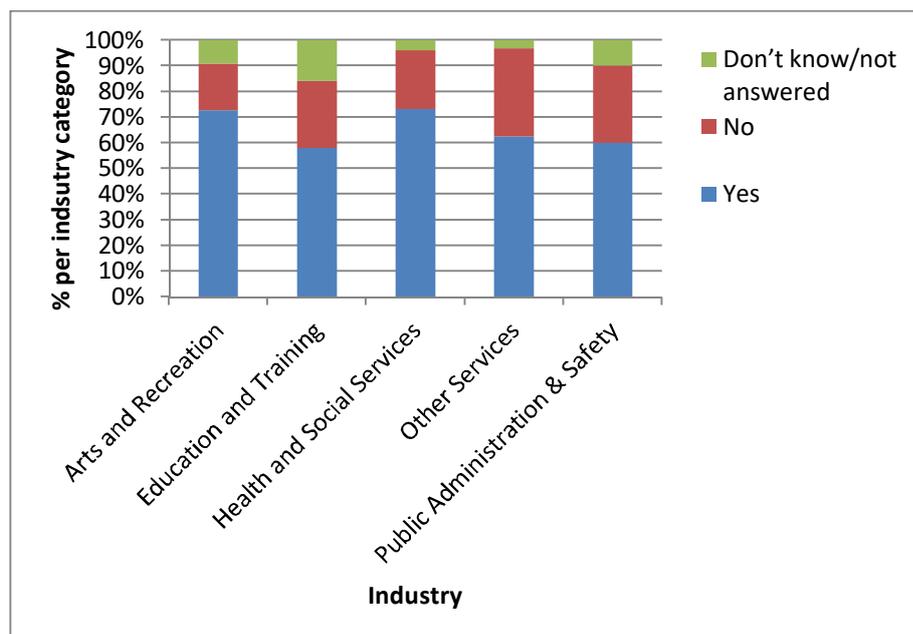


Figure 7.2. Responses to Question 13: “Are your online resources regularly updated?” by industry for the top five industries in the DWAT survey.

7.2. Internal management of the digital aspects of the organisation

In response to Question 17 “Do you have the internal resources to manage the digital aspects of your business such as your website and Facebook?” 74.2% of all respondents said Yes. Somewhat surprisingly, 80% of respondents from NFP/community group workplaces answered Yes, virtually the same percentage as the business respondents (80.8%) whereas only 66% of respondents from government workplaces answered Yes. Given the resources available to government this result was unexpected, however the differences between workplace types regarding the proportions of Yes and No responses were not statistically significant ($\chi^2 = 1.9952$, $df=2$, $.5 > p > .2$). With regard to Question 17, 82% of respondents located in Outer Regional and 76.7% of those in Remote areas said they did have the internal resources to manage the digital aspects of their business, compared to 65.4% from workplaces in Very Remote areas but these differences between location (remoteness) regarding the proportions of Yes and No responses were not statistically significant ($\chi^2 = 2.9325$, $df=2$, $.5 > p > .2$). In order to determine if there were any common underlying characteristics of respondents who did not have the internal resources to manage the digital aspects of their business, responses were

compared to workplace location, size, industry, connectivity type and the regular updating of online resources (Question 13). No strong patterning was evident, rather the proportions tended to reflect those of the broader DWAT sample. The responses of this group were then compared across a range of questions, which revealed that 45.4% of this group did not use technology to identify new markets, services or products (Question 23) and 66.7% did not actively develop new services that could be delivered online (Question 25). Two-thirds of this group also said that their workplace did not have a digital strategy in place (Question 24) and less than 25% of this group said that they had no internal policies and procedures for people working online (Question 20). Although respondents were not specifically asked if they had specialist ICT staff in their workplace or outsourced their ICT, it is suggested that lack of specialist ICT support would be the most likely common characteristic that this group would share.

While more respondents from small-medium and medium-sized workplaces had the internal resources to manage the digital aspects of their business than those from micro or large organisations (Figure 7.3), differences between workplace sizes regarding the proportions of Yes and No responses were not statistically significant ($\chi^2 = 5.7277$, $df=3$, $.2 > p > .1$).

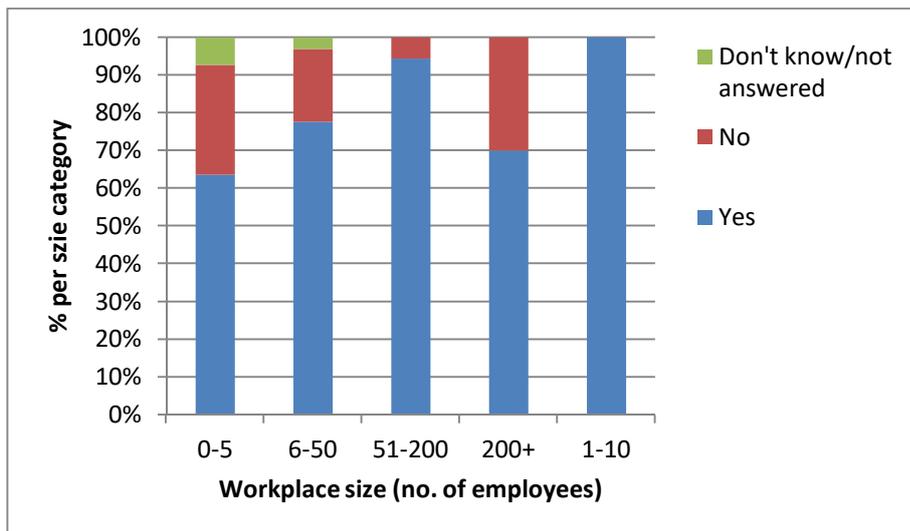


Figure 7.3. Responses to Question 17: “Does your workplace have the ability to internally manage the digital parts of your business, such as your website and Facebook?” by workplace size^{xvi}.

When participants’ responses were grouped by industry, a similar pattern to the responses for Question 13 (regular updating of online resources) became apparent. Again, respondents in the Health, and Arts and Recreation sectors were more likely to have the internal resources to manage the digital aspects of their business, compared to the Public Administration and Education and Training sectors (Figure 7.4). The differences between the top five industries regarding the proportions of Yes and No responses may be of some statistical significance ($\chi^2 = 7.9705$, $df=4$, $.1 > p > .05$).

^{xvi} The total population of category 1-10 staff is n=1. It is included here for the sake of completeness.

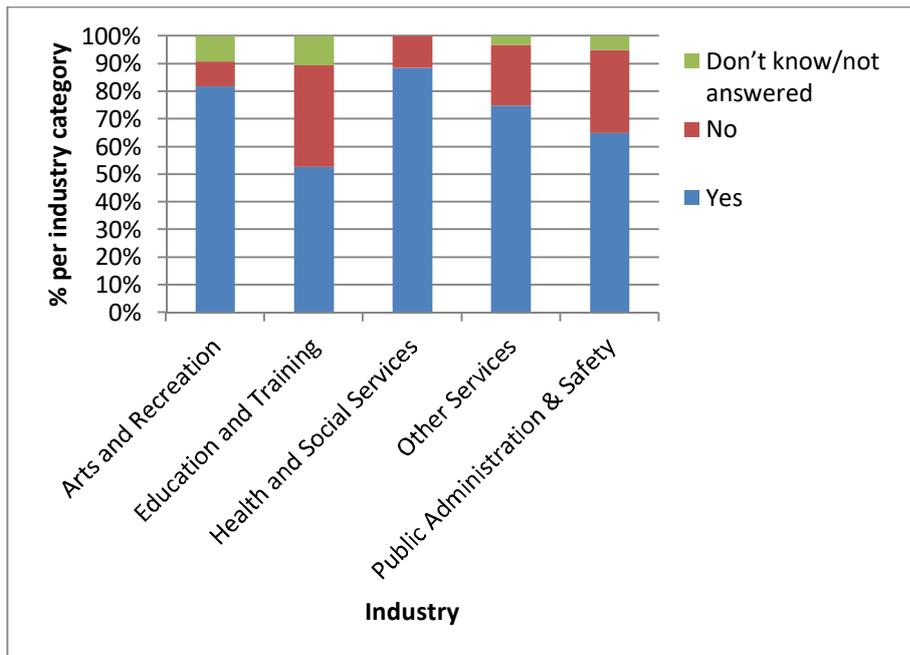


Figure 7.4. Responses to Question 17: “Does your workplace have the ability to internally manage the digital parts of your business, such as your website and Facebook?” by industry.

It should be noted that although most respondents said that they had the internal resources to manage the digital aspects of their business, this did not mean that most respondents actually managed these aspects themselves. Some workplaces opted to outsource some or all of these activities, for example, one Remote participant wrote that “We have the ability to internally manage all IT and social media but we choose to contract out some aspects of it” and another that “We outsource our IT protection and backups to an IT company.”

7.3. Policies and procedures for people working online

Respondents were asked if their workplace had internal policies and procedures for people working online (Question 20). Overall, just under 75% of respondents answered Yes. Not surprisingly, respondents in government workplaces were more likely to have internal policies and procedures for people working online (90.6%) compared to respondents in business (69.2%) or NFP/community groups (65.7%) (Figure 7.5). The differences between workplace types regarding the proportions of Yes and No responses were highly statistically significant ($\chi^2 = 14.1576$, $df=2$, $p<.001$).

A higher proportion of respondents in workplaces located outside the four main urban areas had policies and procedures for people working online (86.5%) than those urban areas (69.7%). This was also apparent when participants’ location by remoteness was examined (Figure 7.6). The differences between workplace locations (remoteness) regarding the proportions of Yes and No responses may be of some statistical significance ($\chi^2 = 5.6281$, $df=2$, $.1>p>.05$). Notably, of those respondents whose workplaces in Very Remote areas relied on satellite connectivity, all but one had policies and procedures in place. One possible reason for this pattern may be the greater temptation for workers in areas with limited or poor Internet access, and/or high connectivity costs, to engage in online activity for personal reasons while at work, hence the greater need to have policies in place. It is also possible this is a legacy of the NT Intervention years, when the Commonwealth had specific

requirements regarding the use of publically-funded computers in Remote and Very Remote Indigenous communities.

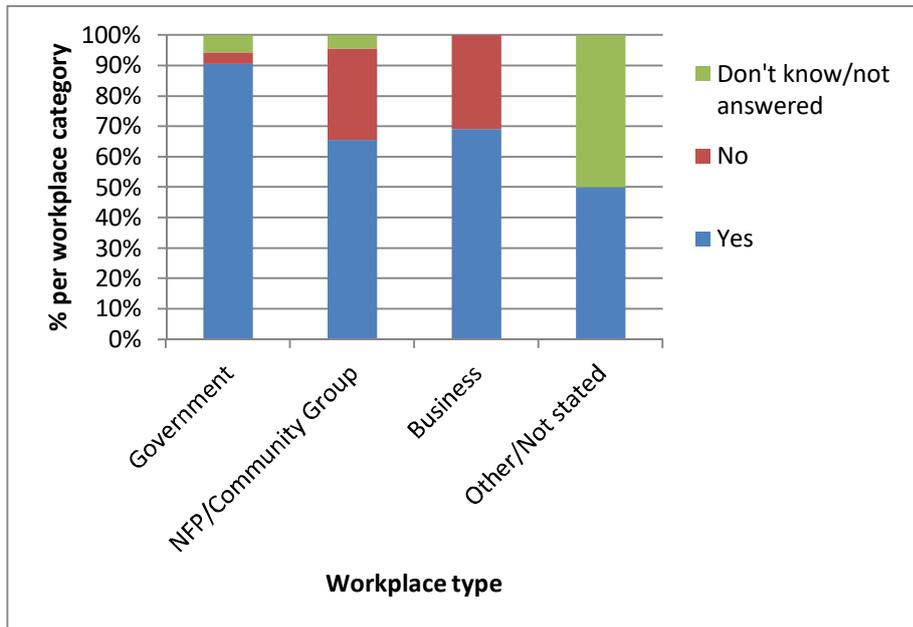


Figure 7.5. Responses to Question 20: “Does your workplace have policies and procedures for your people who are working online (e.g. relating to the use of emails or social media)?” by workplace.

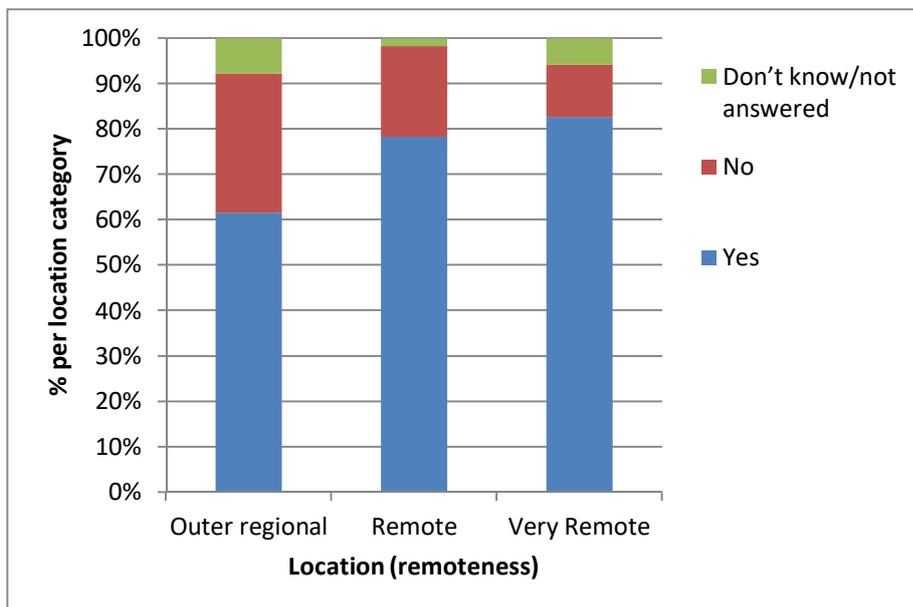


Figure 7.6. Responses to Question 20: “Does your workplace have policies and procedures for your people who are working online (e.g. relating to the use of emails or social media)?” by location (remoteness).

Not surprisingly, a greater proportion of respondents in medium and large workplaces (94.4% and 100% respectively) said that their workplace did have policies and procedures in place, compared to only 61.8% of respondents from workplaces with five or fewer staff (Figure 7.7). The differences

between workplace sizes regarding the proportions of Yes and No responses were statistically significant ($\chi^2 = 9.7515$, $df=3$, $.05 > p > .02$).

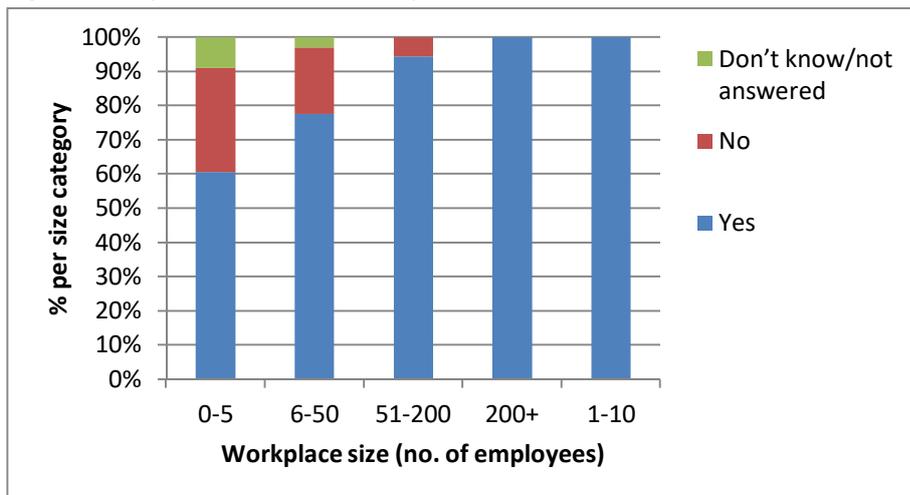


Figure 7.7. Responses to Question 20: “Does your workplace have policies and procedures for your people who are working online (e.g. relating to the use of emails or social media)?” by workplace size^{xvii}.

Consistent with the high percentage of respondents in government workplaces who said they had internal policies and procedures in place relating to use of the Internet, 90% of respondents in the Public Administration sector answered Yes to this question. Just over 92% of respondents in the Health sector responded Yes to this question, a finding which is not surprising in light of the very high levels of privacy and confidentiality required in this sector. In contrast, only 45.4% of respondents in the Arts and Recreation sector answered Yes (Figure 7.8). These differences between the top five industries regarding the proportions of Yes and No responses were highly statistically significant ($\chi^2 = 17.5137$, $df=4$, $.01 > p > .001$).

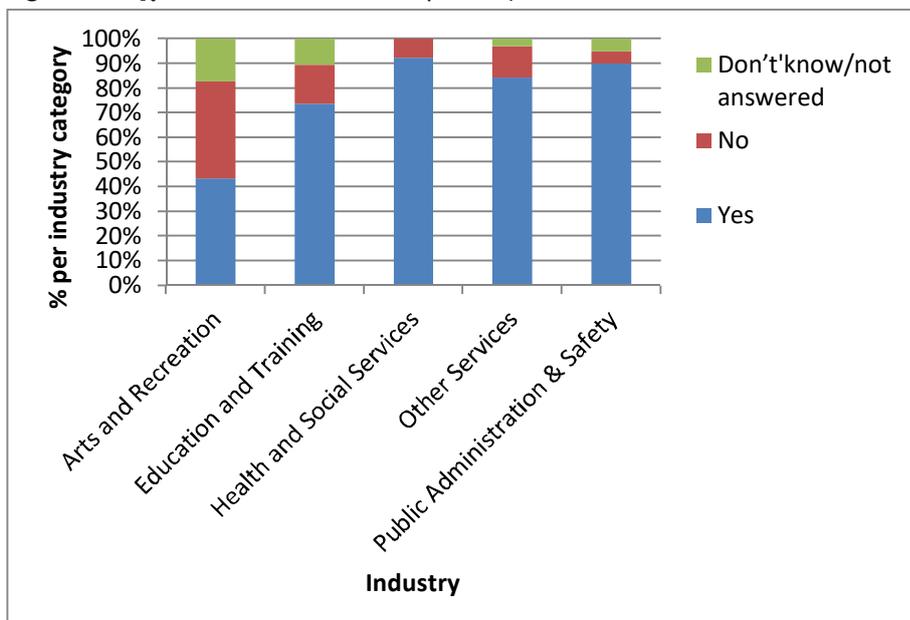


Figure 7.8. Responses to Question 20: “Does your workplace have policies and procedures for your people who are working online (e.g. relating to the use of emails or social media)?” by industry.

^{xvii} The total population of category 1-10 staff is n=1. It is included here for the sake of completeness.

7.4. Data protection, spam and privacy legislation compliance

Question 21 asked whether participants believed their workplace complied with data protection, spam and privacy legislation. Overall, 88.1% of respondents answered Yes to this question, 8.6% said No and the remainder did not answer. Notably, there were no negative responses from respondents in government, although two left it blank. Just over 84% of respondents from businesses and NFPs/community groups answered Yes.

The 13 respondents who answered No to this question came from business and NFP/community group workplaces. With one exception, they were all from workplaces that had 25 or less staff. In terms of location, five were situated in a non-urban area. All but two respondents' workplaces were situated in the Top End. Notably, 10 of the 13 respondents did not have internal policies and procedures for people working online (Question 20) and nearly 54% did not have internal resources for managing the digital aspects of the workplace (Question 17). Differences in the proportions of yes and no responses to Questions 21 (compliance) and 17 (internal ICT management) (Table 7.1), as well in the proportions of yes and no responses to Questions 21 (compliance) and 20 (policies and procedures) (Table 7.2) were statistically significant. It appears that compliance is strongly associated with the existence of the internal capacity to manage the digital aspects of the workplace as well as the existence of internal policies and procedures for people working online.

Table 7.1. Responses to Question 21 by responses to Question 17 (internal ICT management).

Question 21	Question 17		Total
	No. of Yes responses	No. of No responses	
No. of Yes responses	105	25	130
No. of No responses	6	7	13
Total	111	32	143

$\chi^2=8.205$, $df = 1$, $.01 > p > .001$, Significant.

Table 7.2. Responses to Question 21 by responses to Question 20 (policies, procedures etc).

Question 21	Question 20		Total
	No. of Yes responses	No. of No responses	
No. of Yes responses	108	21	129
No. of No responses	3	10	13
Total	111	31	142

$\chi^2=25.9759$, $df = 1$, $p < .001$, Highly Significant.

7.5. Cyber-security

Question 22 asked whether or not there were procedures in place to protect respondents' workplaces (e.g. regular backing up of files or maintenance of an alternative power supply). Previous research in the business and NFP sectors identified concerns around cyber-security as a potential barrier to the adoption and/or greater use of online services. In the DWAT Survey just over 86% of respondents said they had procedures in place, 8.6% said No and the rest left it blank. Among the Yes group, 100% of respondents from government organisations, 92.8% from business and 78.6%

from NFPs/community groups indicated that their workplace had protective procedures in place. However it was clear from some participant's comments that there was a gap between policy and what occurred in practice. For example, two respondents commented that while their workplace had procedures in place they weren't always implemented. Another commented that their workplace "has procedures but in remote areas backing up of personal computers is up to individuals. Access to external hard [drive] is not always possible." One participant was a sole trader who regularly backed-up their data but saw no need to have official procedures in place. Another commented that personal PCs were used for work-related activities and that while these would be subject to protection of the type that might normally be found on a personal PC, the organisation did not have any policies in place regarding data back-ups.

Of the 8.6% that answered No (n=13), all but two were from workplaces with 25 or less staff. Of these, only four were from outside a main urban area. While six were from the Arts and Recreational Services industry, the other respondents were from the Agriculture, Forestry and Fishing, Retail Trade, Other Services, and Public Administration and Safety sectors. Although these 13 respondents relied on various types of connectivity (i.e. wireless, cable/fiber, ADSL2, 3G/4G) none relied on a satellite connection. Notably, of these 13 respondents, nine also had no internal procedures and policies governing workplace use of the Internet (Question 20), five did not have the internal capacity to manage digital aspects of the business (Question 17) and seven did not comply with data protection, spam, and privacy legislation (Question 21).

In terms of ICT management overall, 54.3% of respondents answered Yes to all four Questions 17, 20, 21 and 22. Another 20 respondents answered Yes to Questions 20, 21 and 22 even though they answered No to Question 17, suggesting they may have a greater capacity to manage the digital aspects of their business (particularly in relation to compliance, aspects of cyber-security and general governance of online use) than they realise. About 74% of respondents said they had the internal ability to manage the digital aspects of their business, and a similar proportion said that they had internal policies and procedures regarding online usage in the workplace. Interestingly, a higher proportion of respondents said that they believed they complied with relevant legislation (88.1%) and that they had procedures in place to protect the workplace (data) (86.1%). Overall, around 51% of respondents in Outer Regional and Very Remote areas answered Yes to all four Questions 17, 20, 21 and 22, with a slightly higher proportion of respondents in Remote areas answering Yes to all four Questions (56.7%).

8. Digital business strategies

Chapter 3 noted that adoption of a digital strategy is a critical step in the transformation process as investment in ICT requires a long-term plan for the organisation as well as clear expectations regarding the benefits and outcomes of that investment. Participants in the DWAT survey were specifically asked if their workplace had a strategy to build their digital presence (Question 24). Just over half (52.3%) responded in the affirmative, 40.4% said that they did not, one participant said they “probably” had a strategy, and the remainder did not answer this question. A slightly higher proportion of government respondents (56.6%) answered Yes to this question, compared to 51.4% of respondents from NFPs/community groups and 50% from businesses (Figure 8.1).

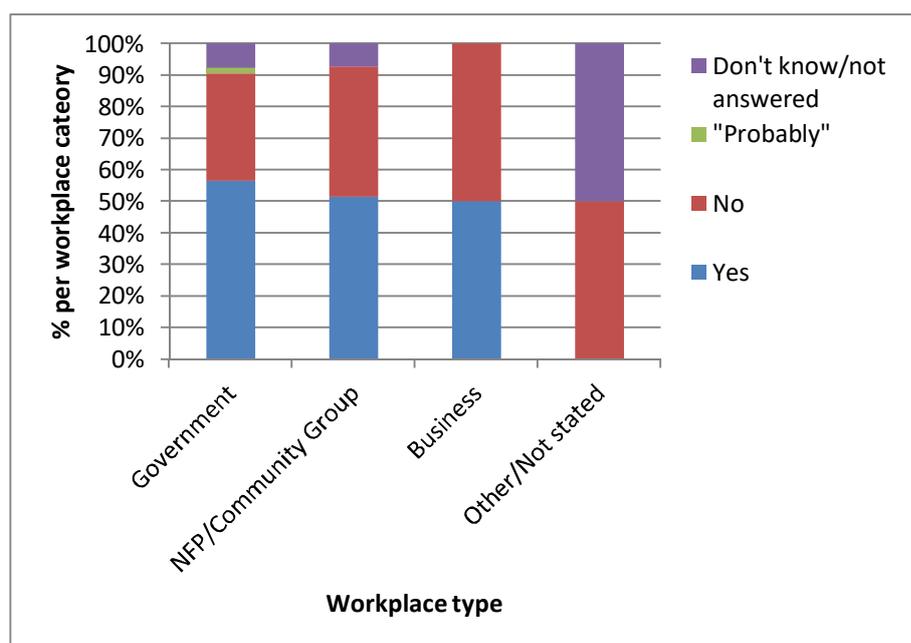


Figure 8.1. Responses to Question 24: “Does your workplace have a strategy to build its digital presence?” by workplace type.

The proportion of respondents from urban and non-urban areas who answered Yes to this question was virtually identical (55.5% and 55.8% respectively). While respondents in remote areas were slightly more likely (56.7%) than those in Outer Regional and Very Remote areas (46.1% and 46.8% respectively) to have a strategy to build their digital presence, no statistical significance can be attached to these differences between locations regarding the proportions of Yes and No responses ($\chi^2 = 0.4886$, $df=2$, $p>.5$). Similarly, differences between connectivity types regarding the proportions of Yes and No responses to Question 24 were not statistically significant ($\chi^2 = 5.7078$, $df=5$, $.5>p>.2$).

When considering workplace size (number of employees) (Figure 8.2), smaller workplaces were less likely to have a digital strategy than larger workplaces. The differences between workplaces (based on size) regarding the proportions of Yes and No responses to this question may be of some statistical significance ($\chi^2 = 7.66$, $df=3$, $.1>p>.05$). These results suggest that in the NT, the number of employees has some impact on whether or not a workplace has a strategy to increase their digital presence and is consistent with research referred to in Chapter 4 which indicated that medium-sized and larger organisations are more likely than small sized organisations to have a digital strategy in place.

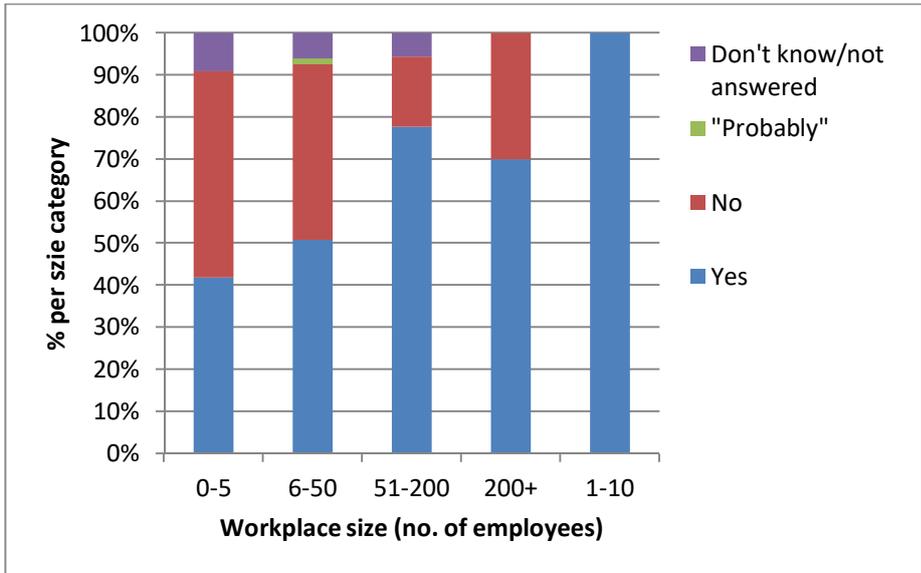


Figure 8.2. Responses to Question 24: “Does your workplace have a strategy to build its digital presence?” by workplace size^{xviii}.

Regarding the top five industries in the DWAT Survey, the Other Services and Healthcare and Social Services industries appeared to be the most proactive in terms of developing digital strategies (Figure 8.3), and the Education and Training sector the least proactive. However the differences between the top five industries regarding the proportions of Yes and No responses to this question were not statistically significant ($\chi^2 = 6.3428$, $df=4$, $.2 > p > .1$).

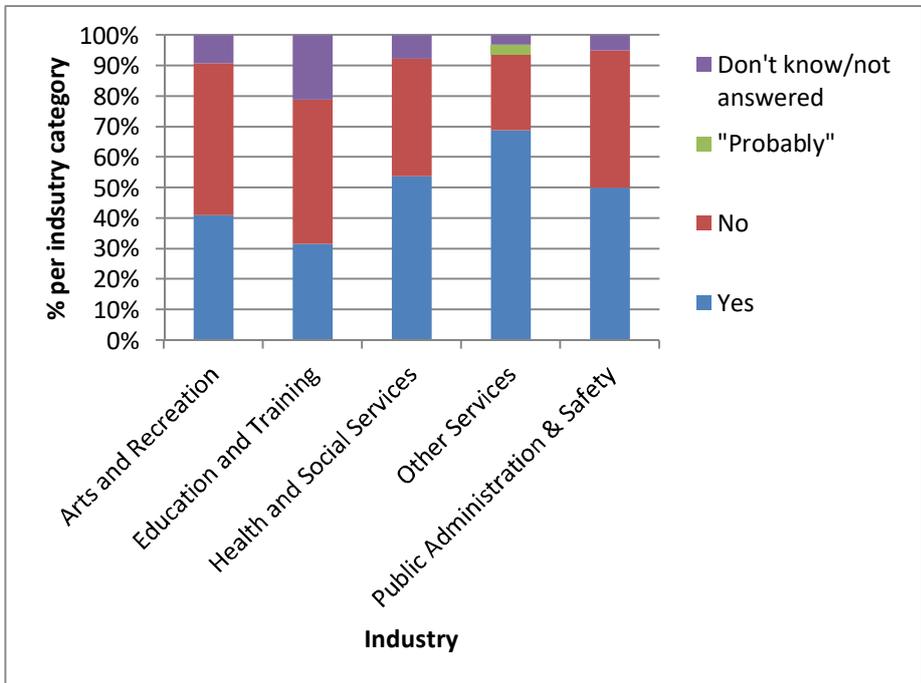


Figure 8.3. Responses to Question 24: “Does your workplace have a strategy to build its digital presence?” by industry for the top five industries in the DWAT survey.

^{xviii} The total population of category 1-10 staff is n=1. It is included here for the sake of completeness.

Responses to Question 24 were considered against responses to Questions 23 (use of technology to identify new markets, services or products) and Question 25 (actively developing new services to be delivered online), which related to innovation, in order to determine the relationship between innovation and the presence of a strategy to build their digital presence. A strong pattern emerged. Of the respondents who answered No to Question 24, 84.6% also answered No to both Questions 23 and 25. Similarly, 87.5% of respondents who answered Yes to both Questions 23 and 25 also answered Yes to Question 24. These differences between the groups that answered either Yes to both Questions 23 and 25, or No to both Questions 23 and 25, regarding the proportions of Yes and No responses to Question 24, were highly statistically significant ($\chi^2 = 43.0041$, $df=1$, $p<.001$).

Responses to all three questions (23, 24 and 25) were then considered in more detail. Of the 151 respondents, 37.1% (n=56) answered Yes to all three questions while 14.6% answered No to all three questions. As shown in Table 8.1, a greater proportion of those who answered Yes to all three questions had the internal resources to manage the digital aspects of the organisation and believed that reliable Internet access was essential to the workplace, compared to those in the No group. The No group was more likely to include workplaces with five or fewer staff and less likely to include medium and large-sized workplaces. The Yes group included a greater proportion of respondents from government workplaces. However the relative proportions of those in different locations (urban/non urban, and remoteness) and whether or not the workplace provided services to remote areas does not substantially differ between the Yes and No groups.

Notably, those in the Yes group were more likely to have undertaken digital training in the workplace (Question 16) compared to those in the No group. These differences between the Yes and No groups (Table 8.1) regarding the proportions of Yes and No responses to Question 16 were highly statistically significant ($\chi^2 = 18.6796$, $df=1$, $p<.001$). As previously noted, it is not clear from the DWAT Survey whether it is digital training that is the causative factor or if digital training has occurred as part of a digital strategy. This relationship, and the relationship between digital training and innovation should be further investigated.

It was noted above that in terms of ICT Management overall, 54.3% (n=82) of respondents in the DWAT Survey answered Yes to all four Questions 17, 20, 21 and 22. Of these 82 respondents, 68.3% also indicated that their workplace had a digital strategy (Question 24). Nearly three quarters (71.4%) of respondents who answered Yes to all five Questions 17, 20, 21, 22 and 24, also undertook digital training (Question 16). These results reinforce the importance of digital knowledge and skills to effectively use ICT. That nearly three quarters of respondents appear to have such skills suggests that there is a reasonable level of digital capability and capacity amongst workplaces in Outer Regional, Remote and Very Remote areas of the NT. This conclusion is consistent with data presented in Chapter 6 regarding NT business use of digital communication and collaboration tools such as Facebook, Skype, Chat, Podcasts and email news.

Table 8.1. Characteristics of respondents who answered either Yes or No to all three Questions 23, 24 and 25.

Feature	% of respondents who answered Yes to Q 23, 24 and 25	% of respondents who answered No to Q 23, 24 and 25
Location:		
Urban	60.7	59.1
Non-urban	39.3	40.9
Outer Regional	21.43	18.18
Remote	46.43	40.90
Very Remote	32.14	40.90
Workplace type:		
Govt	46.4	36.4
NFP-CP	37.5	40.9
Business	16.1	18.2
Other	0	4.5
Workplace size:		
0-5 staff	28.6	40.9
6-50	46.4	40.9
51-200	14.3	9.1
over 200	8.9	4.5
1-10	1.8	0
Top five industries:		
Arts and Recreational Services	16.1	18.2
Education and Training	5.3	13.6
Healthcare & Social Services	10.7	18.2
Other Services	35.7	22.7
Public Administration and Safety	12.5	13.6
Services to remote areas:		
Yes	60.7	63.7
No	35.7	36.3
Don't know/did not answer question	1.8	0
Connectivity:		
ADSL2/2+	23.2	18.2
Cable/Fiber	8.9	27.3
CITRIX	8.9	0
3G/4G	8.9	4.5
Satellite	16.1	18.2
Wireless	21.4	22.7
Don't know	14.3	9.1
Q 16 (undertake digital training):		
Yes	69.6	18.2
No	26.8	81.8
Don't know/did not answer question	3.6	0
Q 17 (internal resources to manage digital aspects of the business):		
Yes	91.1	50
No	7.1	50
Don't know/did not answer question	1.8	0
Q 26 (reliable Internet access is essential to the workplace):		
Yes	96.4	81.8
No	3.6	13.6
Other/no response	0	4.5

9. Drivers and barriers

It was noted in the broader literature that amongst SMEs attitudes towards the Internet could either be a driver or barrier to the adoption and usage of ICT. Participants in the DWAT Survey were asked if they believed that reliable Internet access was essential to their workplace (Question 26). The overwhelming majority (93%) responded in the affirmative. This suggests that in the NT, negative attitudes or scepticism regarding the benefits of the Internet are not likely to be a significant barrier. Instead, it is suggested that perceptions as to the suitability of a workplace's main activities for greater ICT adoption and usage is likely to be a more important determinant. For example, one Remote participant expressed the view that "We are a location-based, site-specific experience with limited opportunities to increase technological assistance in daily operations."

9.1 Drivers for ICT adoption

The DWAT Survey asked several questions to assess the level of perceived benefit of using the Internet amongst participants. Around 83% said their workplace used technology to benefit their clients (Question 10) and just under 71% had staff who teleworked (Question 14) suggesting that these may be important drivers in terms of Internet adoption. However, only 55% believed that technology had reduced their operational costs (Question 9), while 35.8% said No and the remainder were unsure or did not answer this question. In terms of the magnitude of the cost reduction, estimates provided by respondents ranged from 2% up to 80% with the median around 15% (as a percentage of savings). While no significant differences among workplace types were apparent, there were slight differences when users responses were compared by location (remoteness) with a greater proportion of those in Outer Regional areas answering Yes compared to those in Remote and Very Remote areas. These results suggest that potential for reduction in operational costs is not a substantial driver of ICT adoption and Internet usage, particularly in Remote and Very Remote areas. Similarly, the proportion of respondents that said they used applications to reduce their travel was not particularly high (55%). While no significant differences between workplace types or location (remoteness) was apparent, a significantly higher proportion of users in urban areas used applications to reduce travel compared to users in non-urban areas. Use of ICT to reduce travel appears to be a driver for those in urban areas but not for those in non-urban areas.

9.2 Barriers to ICT adoption

Research referred to earlier in this report indicates that poor digital literacy and lack of confidence are major barriers to ICT adoption and use. While costs and technological issues were also identified as barriers, they did not feature as prominently. Nonetheless lack of reliable Internet access is often cited as a key barrier for individuals and organisations living and working in rural, regional and remote Australia.

Respondents in the DWAT Survey were asked if their level of Internet access enabled them to adequately utilise the applications that they used in their workplace (Question 6). About three quarters (75.5%) of respondents answered Yes. Of the 21.9% (n=33) who responded negatively to this question, speed and reliability were most commonly raised as issues. Notably, of these 33 respondents, 42.4% relied on satellite connections, 15.1% on wireless and 12.1% on 3G/4G. Respondents from government workplaces were more likely than those in business or NFP/community group workplaces, to indicate that their level of Internet access was not adequate.

Overall, the results of the DWAT Survey suggest that Internet speed and reliability are significant barriers to greater Internet usage in the NT, particularly those that rely on satellite connections.

While 58% respondents indicated that their workplace used online training to up-skill people (Question 15) only 39.1% indicated that their workplace undertook digital training (Question 16). Given that over 74% of respondents also indicated that their workplace had the internal resources to manage the digital aspects of their business (Question 17) it cannot be assumed that lack of digital training equates to poor digital literacy. Reasons for the low levels of digital training were not explored as part of the DWAT Survey but should be further investigated prior to the development of any new digital training programs and as part of any future research assessing the digital capacity and capability of Territory workplaces.

Part II of this report has characterised the digital capacity and capability of Territory workplaces at a general level. In doing so it has become apparent that there are significant differences between workplaces according to their location and type of workplace, which are described in the following Part of this report. These findings have implications for both telecommunications and digital economy policy development and program delivery. At a broader level some of our findings challenge some of the common assumptions underlying broader policy relating to regional development and specifically development of Northern Australia. These are discussed in the final chapter.

Part III

United Nations Resolution A/HRC/RES/26/13 called on all states to “promote and facilitate access to the Internet” and to “promote digital literacy and to facilitate access to information on the Internet”

-United Nations General Assembly Human Rights Council 2014³²⁴

10. Impact by remoteness

This section profiles respondents in the DWAT Survey according to their remoteness location (Figure 10.1) and highlights strengths and weaknesses for each group. These differences demonstrate that a one-size-fits-all approach is not the most appropriate strategy for the NT. Instead, this data may be used to develop a more targeted suite of strategies, policies and practical delivery of programs based on remoteness.

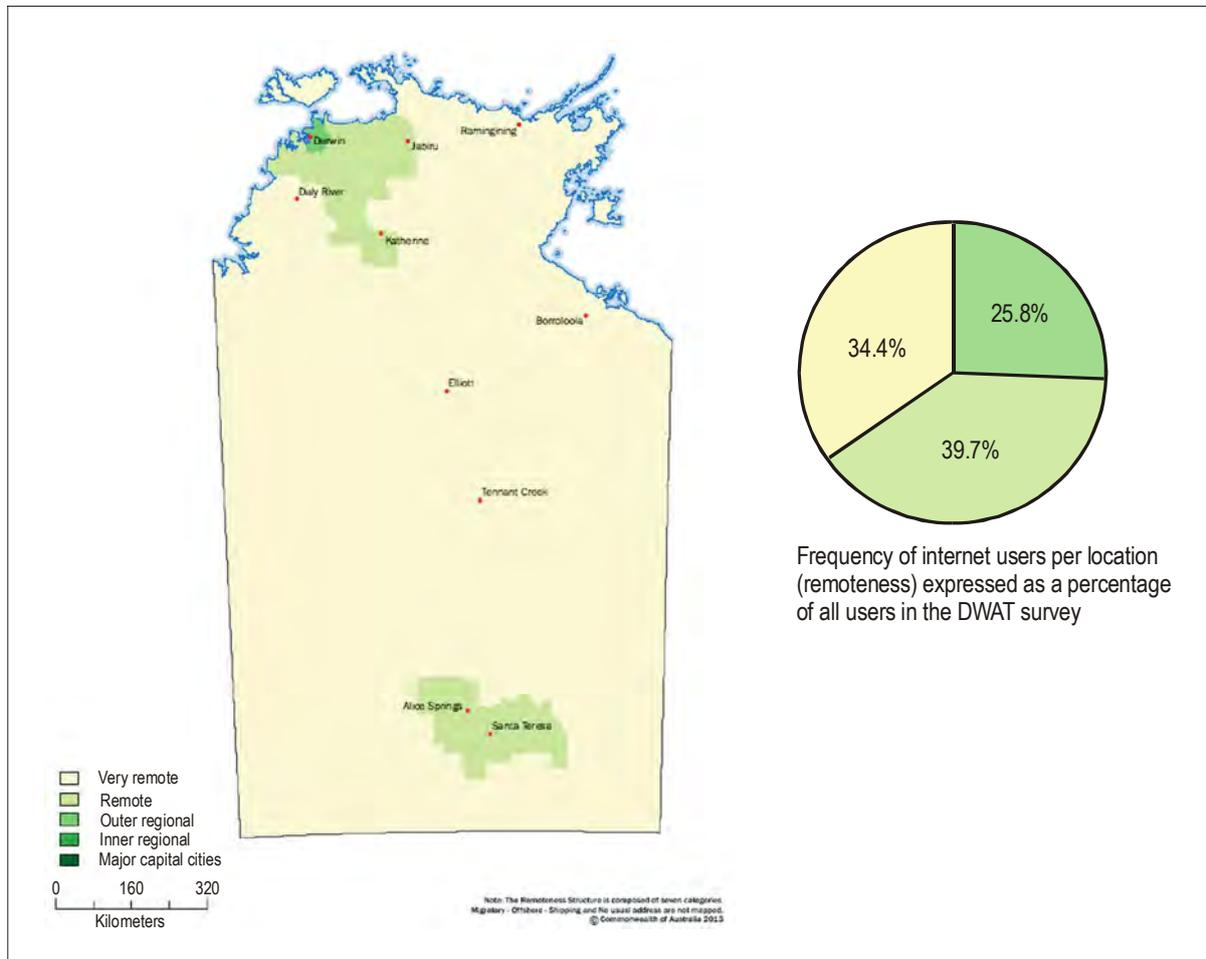


Figure 10.1. Location of Outer Regional, Remote and Very Remote areas of the NT and frequency of Internet users in the DWAT survey

10.1 Outer Regional workplaces

All respondents workplaces in Outer Regional areas were located in the main urban areas of Darwin-Palmerston with the exception of one located on the fringe. Of these, nearly two-thirds were NFP/community group organisations (61.5%), followed by government agencies (20.5%). Within the Outer Regional area, 12 ABS industry divisions were represented, with the most common being Other Services (20.5%), Health and Social Services (15.4%), Arts and Recreation Services (12.8%), Education and Training Services (12.8%), and Public Administration and Safety (12.8%).

Just over 46% of Outer Regional workplaces represented in the DWAT Survey employed 6-50 people, while around one-third were micro and non-employed organisations. Only one organisation

employed over 200 people. Just under 50% of respondents indicated that their workplace provided services to areas with limited/no telecommunications.

The majority of Outer Regional workplaces relied on wireless (33.3%), closely followed by ADSL2/ADSL2+ (30.8%), 3G/4G (12.8%) and cable/fibre (12.8%). As a group, Outer Regional workplaces ranked highest in terms of having adequate access to the Internet (87.2%), use of mobile technologies (87.1%), using the Internet to reduce travel (64.1%) and operational costs (71.8%), regularly updating their online resources (74.3%), and having the internal resources to manage the digital aspects of their business (82%). These results are not surprising given that generally those in the Outer Regional areas of the NT have access to greater choice and more reliable telecommunications and mobile coverage compared to Remote and Very Remote areas. In addition, many of these organisations had headquarters in Darwin-Palmerston, which tended to have primary responsibility for ICT.

Somewhat surprisingly, Outer Regional respondents ranked lowest in terms of using the Internet to benefit their clients (76.9%), teleworking (64.1%), online training (56.4%), recruitment (66.7%), internal policies and procedures governing Internet use at work (61.5%), and cyber-security (79.4%). The latter two are particularly surprising given that as a group, Outer Regional respondents ranked highest with 82% having the internal resources to manage the digital aspects of the business.

10.2. Remote workplaces

Although categorised as a Remote area using the ABS Remoteness Structure, the majority of Remote workplaces were actually based in urban environments such as Katherine or Alice Springs (81.7%). This explains the relatively high occurrence of ADSL/ADSL2+ and wireless connectivity (around 22% and 18% respectively). The majority of Remote respondents were from NFP/community group workplaces (50%) although not to the same extent as Outer Regional respondents (61.5%). Staff from government agencies comprised one-third of Remote respondents with the business sector making up the remainder. Remote respondents were spread across 10 ABS industry divisions in roughly similar proportions to Outer Regional respondents, with the exception of Education and Training, which was represented by only 6.7% of Remote workplaces. There were proportionally more respondents from the Professional, Scientific and Technical Services (11.7%) sector compared with Outer Regional respondents.

Compared to Outer Regional workplaces, there were proportionally more micro and non-employed workplaces (41.7%) and very large workplaces with over 200 people (8.3%) represented in the Remote respondent group. Just over 68% of Remote respondents said that their workplace provided services to areas with limited/no telecommunications. As a group, they ranked highest in terms of their use of the Internet to benefit their clients (90%), recruitment (83.3%), compliance with data protection, spam and privacy legislation (91.7%), cyber-security (91.7%), looking for new markets, products and services online (70%), and developing new services that could be delivered online (58.3%). This group also ranked highest in terms of their use of cloud computing (56.7%), online training (58.3%) and digital training (40%), as well as having a digital strategy (56.7%).

10.3. Very Remote workplaces

Unlike Remote area respondents, the majority of Very Remote workplaces (76.9%) were not located in one of the four main urban areas. Reflecting their Very Remote location, the most common type of connectivity amongst this group was satellite (25%), followed by wireless (23%). The majority of workplaces using CITRIX were all situated in Remote and Very Remote areas. Most respondents from Very Remote areas were from government workplaces (48.1%) or NFP/community groups (30.1%). Despite the predominance of government, 15 ABS industry divisions were represented. The most commonly identified was Other Services (19.2%), followed by Health and Social Services (17.3%), Education and Training (17.3%), Art and Recreation Services (15.4%), and Public Administration and Safety (11.5%).

Around 40% of Very Remote respondents' workplaces employed 6-50 people, while 34.6% were micro or non-employing organisations. The proportion of respondents from workplaces with over 200 employees (7.7%) was similar to the Remote respondents group and far greater than Outer Regional respondents. Just over 69% of respondents said their workplace provided services to places with limited/no telecommunications.

As a group, Very Remote workplaces ranked highest regarding use of ICT to telework (71.1%) and having internal policies and procedures to govern workplace use of the Internet (82.7%). As a group they were also the most reliant on government websites for sources of information (90.4%), which may reflect both the high proportion of respondents from government workplaces as well as their lack of access to business networking events, gatherings, seminars and so on, that usually occur in urban settings.

Very Remote respondents ranked lowest on questions which directly related to their type and nature of access to telecommunications technologies, including having adequate levels of access to the Internet (63.5%); using mobile technologies (86.5%); and innovation, such as looking for new markets, products and services online (63.5%) and developing new online services (50%). They also ranked lowest on questions regarding workplace/organisational structure and capacity, e.g. regularly updating online resources (25%) and internal capacity to manage the digital aspects of the business (65.4%). These latter activities are often undertaken by head offices or parent organisations based in larger service centres. As a group, Very Remote workplaces also ranked lowest on the questions regarding use of the Internet to reduce operational costs and travel (53.8% each). In part, these results reflect the comparatively high proportion of respondents reliant on satellite connectivity, which is expensive and has inherent limitations. It was also suggested that the cost of working in Very Remote areas (e.g. freight, food, fuel) are substantially higher and therefore less likely to be offset by technology alone.

Comparing the urban/non-urban split across the whole DWAT sample, while most urban respondents (63.6%) indicated that they used applications to offset travel costs, the majority of non-urban respondents (59.6%) did not. It is suggested non-urban respondents did not use applications to reduce their travel due to poor connectivity (e.g. limitations inherent in satellite technology) as well as a tendency for people in Very Remote areas to do multi-purpose trips into town (maximising the opportunity-cost) rather than attempting to avoid travel.

10.4. Summary

Over 92% of survey respondents believed that Internet access is essential for their workplace, particularly those in Remote areas (97%). Viewed in this context, equity and access to reliable and affordable telecommunications, including the Internet, assumes greater importance than in metropolitan areas where greater choices and alternatives exist. This also suggests that attitudes towards the Internet are not a significant barrier to ICT adoption and uptake in the NT.

Highly significant differences emerged between respondents based on workplace location (remoteness) and the adequacy of Internet access (Figure 10.2), reliance on government websites for information (Figure 10.3) and frequency of updating online resources (Figure 10.4). One of the most notable differences related to the adequacy of Internet services. Over 80% of respondents in Outer Regional areas said their level of Internet access enabled them to adequately utilise their workplace applications, compared with only 63% in Very Remote areas. There is also a clear relationship between level of remoteness and reliance on government websites for information. This is likely to reflect a combination of at least two factors: the predominance of the government sector in Very Remote areas, and lack of ready access to alternative sources of information.

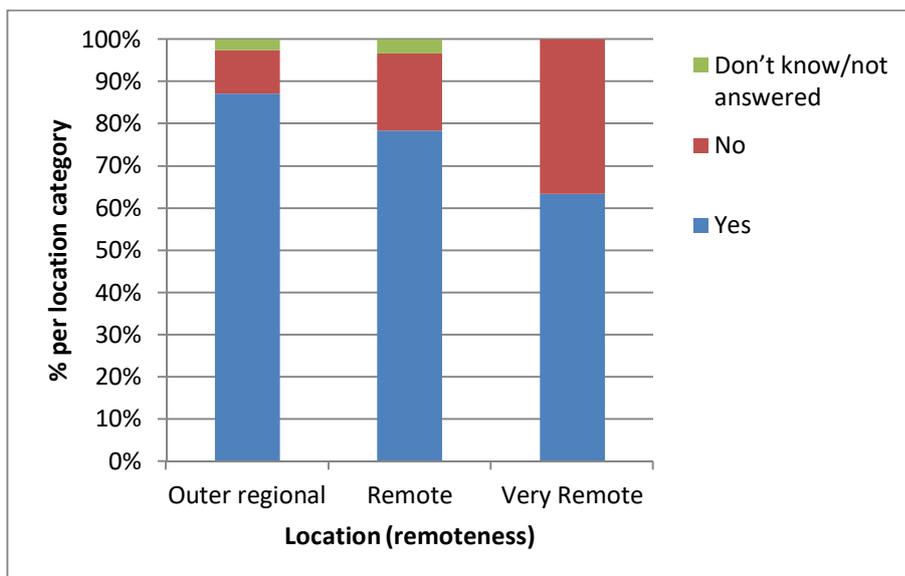


Figure 10.2. Responses to Question 6: “Does your level of Internet access enable you to adequately utilise the applications you use?” by location (remoteness).

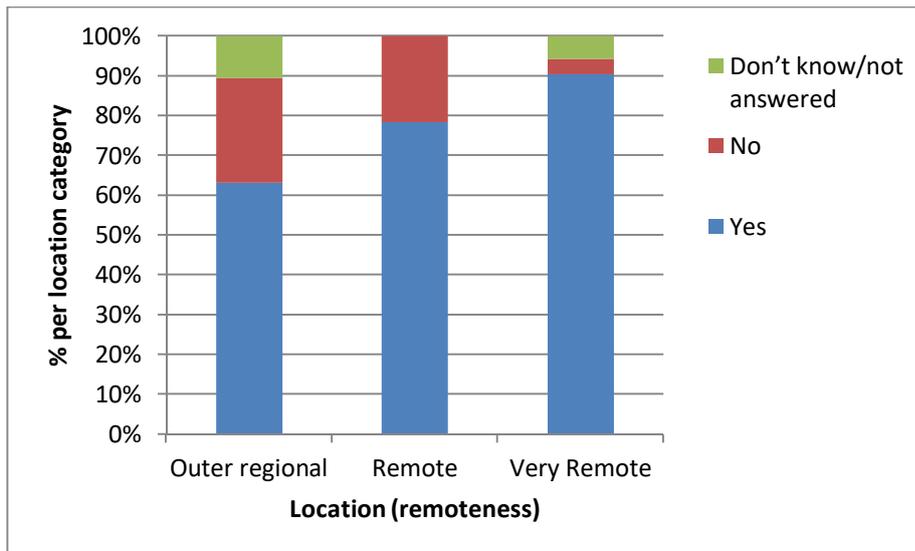


Figure 10.3. Responses to Question 19: “Does your workplace rely on government websites for up to date information?” by location (remoteness).

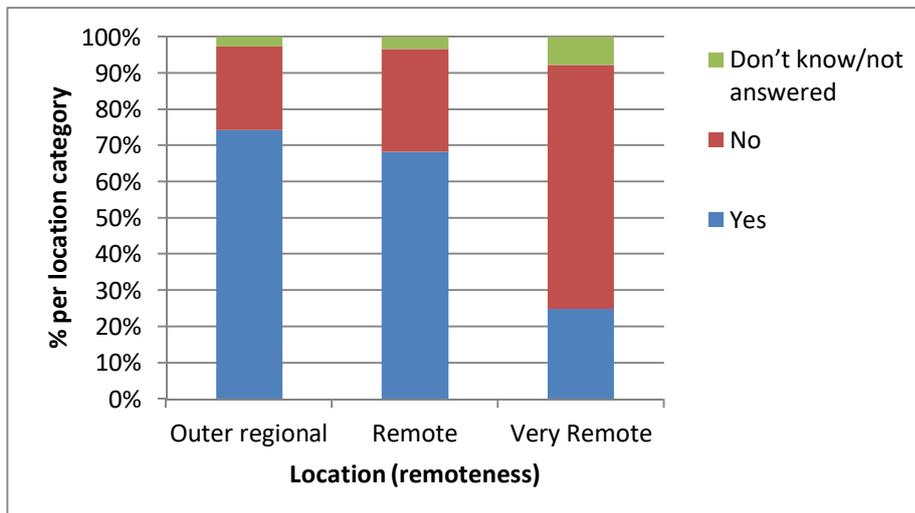


Figure 10.4. Responses to Question 13: “Are your online resources regularly updated?” by location (remoteness).

DWAT data suggests that Very Remote workplaces are less likely to regularly update their online resources compared to those in Remote and Outer Regional areas. Comments from survey respondents indicated the reasons for this may include: ICT management by head office/parent organisation; difficulty getting approval to update their webpage; lack of available staff/specialists with the necessary skills; lack of a website and/or Facebook page; and lack of time. The first three reasons are consistent with the predominance of government agencies in Very Remote areas, in which activities such as marketing and communications, recruitment, and so on, tend to be undertaken by head offices based in larger service centres.

Differences between respondents based on workplace location (remoteness) and using the Internet to reduce operational costs (Figure 10.5) and having internal policies and procedures for people working online (Figure 10.6) may be of some significance. It was anticipated that a greater

proportion of Remote and Very Remote workplaces would use technology to reduce their operational costs, but this was not the case. When compared with their type of connectivity, it became apparent that, with the exception of those using satellite connectivity, most had used technology to reduce operational costs. In contrast, the overwhelming majority of satellite respondents (66.7%) said that this was not the case. As previously mentioned, other costs such as transport, power, water and so on, may be sufficiently high that use of technology alone cannot offset operational costs. The high cost of satellite services relative to other types of connectivity is also likely to be a factor.

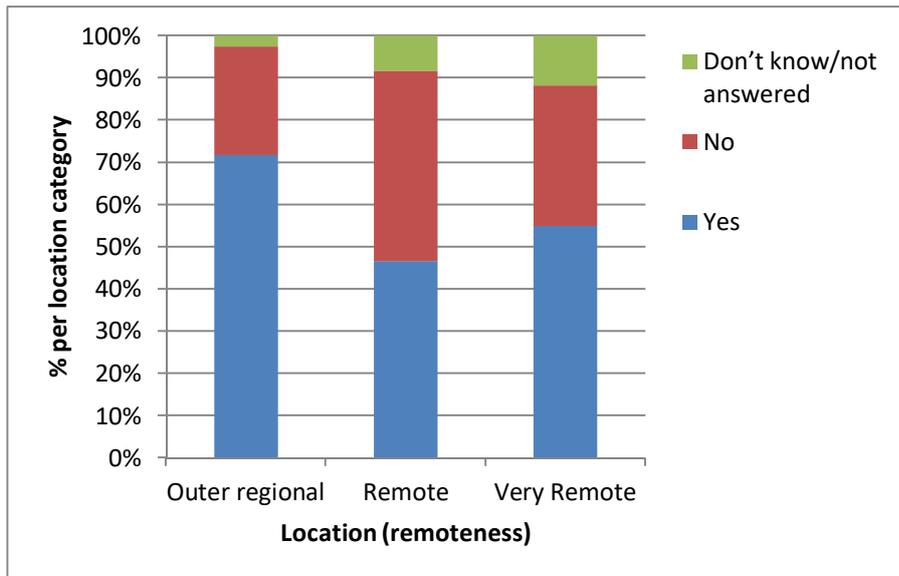


Figure 10.5. Responses to Question 9: “Has the use of technology allowed your workplace to reduce operational costs?” by location (remoteness).

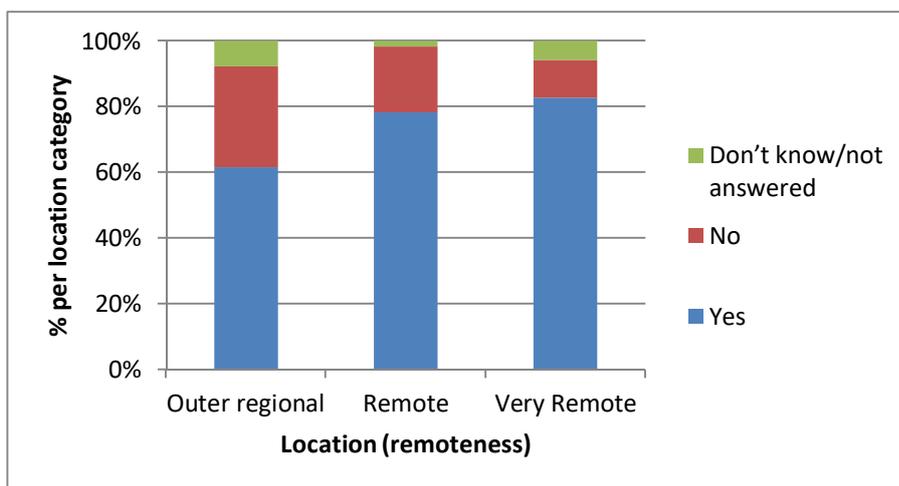


Figure 10.6. Responses to Question 20: “Does your workplace have policies and procedures for your people who are working online (e.g. relating to the use of emails or social media)?” by location (remoteness).

Differences between workplaces in urban and non-urban locations regarding the use of applications to reduce travel were highly significant (Figure 10.7). Respondents who said they did not use applications to reduce their travel cited reasons such as lack of reliable connectivity (41.9%), no need

or lack of applicability (23.2%) and slow service (speed) (9.3%). There were highly significant differences between workplaces responses according to their type of connectivity.

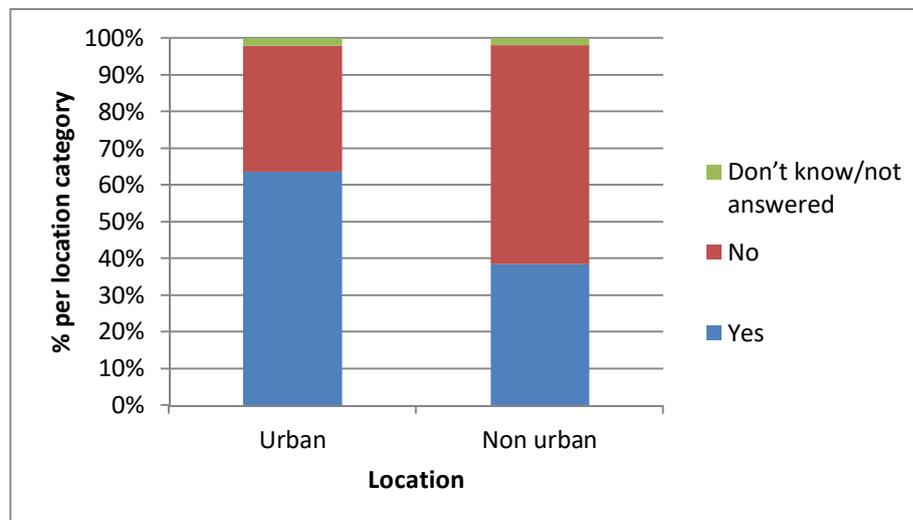


Figure 10.7. Responses to Question 11: “Does your workplace use applications to reduce travel such as web and video conferencing?” by location (urban vs non-urban).

Very Remote workplaces were slightly more likely than those in Outer Regional areas to have policies and procedures regarding use of the Internet at work. Reasons for this may be that there is a greater temptation for workers to engage in online activity for personal reasons in areas with limited or poor Internet access. It is also likely that the predominance of government agencies (which are more likely to have such systems in place) in remote areas is a contributing factor along with the legacy of the NT Intervention years. Notably, only one respondent in Very Remote areas who relied on satellite connectivity indicated that they did not have policies and procedures in place.

There were no significant differences between workplaces based on location (remoteness) in relation to innovation, level of internal resources to manage the digital aspects of the business or development of strategies to increase their digital presence. Similarly there were no substantial differences between workplaces based on location regarding whether or not they undertook online training, digital training, or used the Internet as part of the recruitment process. The latter was initially somewhat surprising, but less so once the tendency for recruitment to be undertaken by an organisation’s head office was considered; many Very Remote and some Remote workplaces are subsidiary to parent organisations based in Darwin or larger service centres.

To ascertain the overall digital capacity and capability of Internet users in the DWAT Survey by location (remoteness), responses to Questions 5 – 26 inclusive were ranked from highest (1) to lowest (3) and then totalled. The Remote users’ total rank score was 35, compared to 48 for Outer Regional and 47 for Very Remote users.^{xix} That Remote users appear to have a greater digital capacity and capability challenges perceptions that have been documented elsewhere, where rural residents are more likely to be seen as being ‘behind the times’ compared to people living in urban areas.³²⁵ Further, it may be argued that the low overall score for Very Remote users (Figure 10.8)

^{xix} Questions 1 – 4 were not included in these rankings because they related to type of connectivity and were answered by users and non-users.

reflects the predominance of satellite technology and the nature of workplaces in these areas, rather than a lack of innovation or skill, given the absence of any significant differences between workplaces (based on remoteness) regarding questions around innovation, online and digital training, and existence of digital strategies, for example.

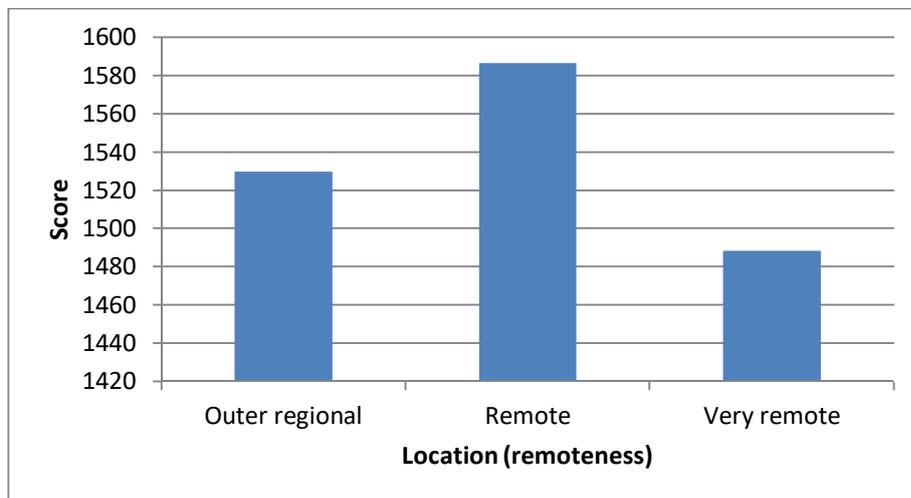


Figure 10.8. Overall digital capability and capacity scores for workplace locations, based on participants responses to DWAT survey questions 5 – 26 inclusive.

11. Impact by workplace type

The purpose of this section is to briefly profile each type of workplace and highlight particular strengths and weaknesses in each category. While the business sector results are included here, readers should treat these figures cautiously owing to the relatively small sample size for this sector in the DWAT Survey.

11.1 Business workplaces

When considering business workplaces in the DWAT Survey, most were based in Remote (38.5%) and Very Remote (38.5%) areas, and the majority (61.5%) provided services to areas with limited/no telecommunications. In terms of their structure, most were Companies (50%) with a few Sole Traders (19.2%), and one Trust. The remainder did not specify their business structure. Just under half were micro or non-employing businesses with fewer than six employees (42.3%), followed by employed 6-50 people (34.6%) while only one business had more than 200 employees. A range of industry sectors was represented (Figure 11.1) with the majority being in the Professional, Scientific and Technical Services; Construction, and Mining sectors.

Regarding connectivity, most business respondents relied on ADSL/ADSL 2+ (42.3%) and wireless (34.6%) in their workplace. Only one relied on satellite and very few used 3G/4G (7.7%). While these results were somewhat surprising given the remote location of some of these businesses, closer examination revealed that of those situated in Remote and Very Remote areas, 50% were located in urban centres such as Alice Springs, Tennant Creek or Katherine, and 35% in Nhulunbuy.

As a group, business workplaces ranked the highest in terms of the percentage of respondents that used the Internet to reduce their operational costs (69.2%) and travel (65.4%), cloud computing (61.5%) and use of the Internet to look for new markets, products and services online (76.9%). Business workplaces ranked equal highest with the NFP/community group sector when it came to having an adequate level of Internet access and internal resources to manage the digital aspects of the business (around 80% each). It ranked equal highest with government workplaces regarding use of the Internet to benefit clients (88%).

In contrast, as a group business workplaces ranked lowest when it came to undertaking digital training (34.6%), having a digital strategy (50%), using the Internet for recruitment (61.5%) and using the Internet to develop new online services (42.3%). This sector ranked equal lowest with NFP/community group workplaces in terms of complying with relevant legislation (around 84%).

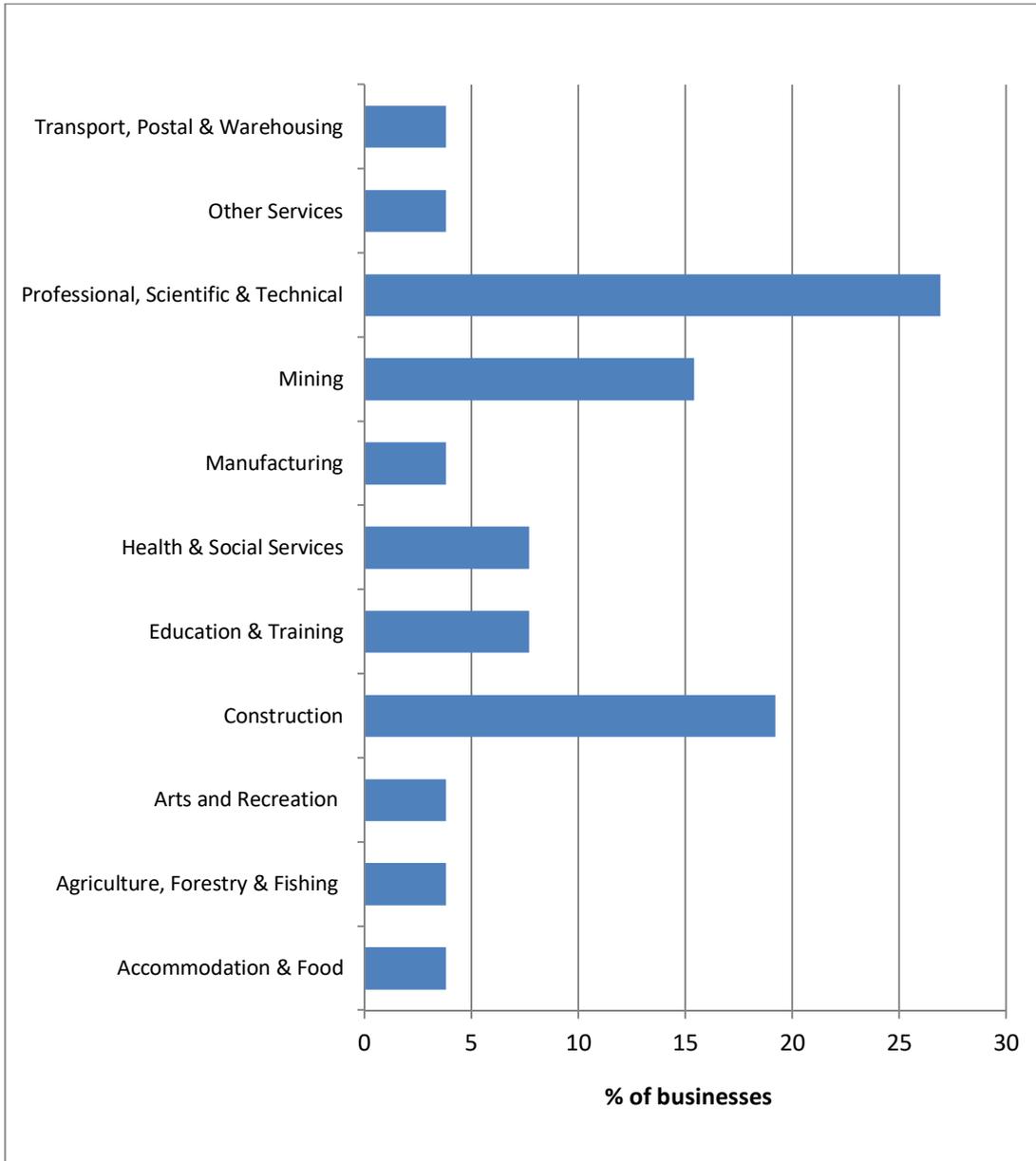


Figure 11.1. Industry sectors expressed as a percentage of the total number of businesses in the DWAT survey.

It was noted earlier in this report that when asked to rate their level of ICT adoption, 46% of Territory businesses (all sizes) rated themselves as 'average', 16% thought they were 'fast followers' and only 5% thought they were 'leading edge'. Although no one admitted to being 'in trouble', 30% said they 'lagged behind'.³²⁶ In the DWAT Survey just over 80% said they had the internal resources to manage the digital aspects of the business, but only 50% indicated that they had a strategy to enhance their digital presence. While business respondents appeared to be proactive in terms of using the Internet to reduce their costs, they were less so when it came to innovative use of the Internet. Only 34.6% answered Yes to both the innovation questions (Questions 23 and 25).

11.2 NFP/community group workplaces

The majority of respondents from NFP/community group workplaces were situated in Remote (42.8%) and Outer Regional areas (34.3%) of the NT. Most (58.6%) provided services to areas with limited/no telecommunications. Around 44% of respondents' workplaces had 6-50 employees and 41.4% had five or less employees. Eight workplaces had between 51 and 200 employees and one employed over 200 people.

Most NFP/community group participants worked in the Health and Social Services sector (28.6%), followed by Arts and Recreation (22.8%) and Other Services (14.3%) sectors. Other industry sectors included Administrative and Support Services; Agriculture, Forestry and Fishing; Education and Training; Information Media and Technology; Professional, Scientific and Technical Services; Public Administration and Safety; Retail Trade and Transport; Postal and Warehousing.

Most of the respondents from NFP/community groups relied on ADSL/ADSL2+ (28.6%) and Wireless (28.6%). Only three relied on satellite connections and six used 3G/4G. A substantial proportion did not know what type of connectivity their workplace used (21.4%).

As a group, participants from NFP/community groups ranked highest in terms of use of mobile technologies (90%), regularly updating their online resources (81.4%) and undertaking digital training (41.4%). They ranked equal highest with business workplaces regarding adequate levels of access to the Internet (80%) and having the internal resources to manage the digital aspects of the business (around 80%).

However, NFP/community group workplaces ranked lowest in terms of using the Internet to benefit their clients (78.6%), reduce travel (52.8%), cloud computing (44.3%) and looking for new markets, products/services online (61.4%). Despite ranking highest for undertaking digital training (41.4%), they ranked lowest for undertaking training online (44.3%). They also ranked lowest in terms of having policies and procedures in place to guide Internet use (65.7%) and cyber-security (80%). NFP/community groups were equal lowest with business workplaces in terms of complying with relevant legislation (84%).

11.3 Government workplaces

Most government respondents were located in Very Remote (47.2%) and Remote (37.7%) areas. Just over half of the government respondents worked in Local Government (52.8%), followed by NT Government (34%) while 13.2% worked in Commonwealth Government agencies. Nearly half the government respondents indicated that their workplace employed 6-50 people (49%). Notably, eight employed over 200. Most government respondents worked in Other Services (39.6%) followed by Public Administration and Safety (32.1%), Education and Training (16.7%), and Health and Social Services (7.5%). Other industry sectors included Agriculture, Forestry and Fishing; Arts and Recreation; Finance; Professional, Scientific and Technical Services; Accommodation and Food. This reflects the broad role that local government plays in delivering a wide range of programs and services in Remote and Very Remote areas. Overall, 73.6% government respondents indicated they provided services to rural and remote areas with limited/no telecommunications.

Most of the respondents in these workplaces said they relied on Satellite (26.4%), followed by Wireless (15.1%), Cable/Fiber (13.2%) and the CITRIX system (13.2%). Nine respondents did not know what type of connectivity their workplace used and only three relied on 3G/4G. This is not surprising given the predominant location of government respondents' workplaces in Remote and Very Remote areas with patchy, limited mobile coverage.

As a group, government workplaces ranked highest regarding use of the Internet for telework (75.5%), recruitment (86.8%), training online (73.6%) and ICT management, including policies and procedures (90.6%), compliance with legislation (96.3%) and cyber-security (96.2%). They also ranked highest in terms of having digital strategies (56.6%) and developing online services (60.4%). This may partly reflect the Commonwealth Government policy to shift activities with more than 50,000 transactions per annum online. In light of this however, it is interesting to note that only 66% of government respondents said they had an adequate level of Internet access, compared to around 80% of respondents from business and NFP/community groups.

Government workplaces ranked lowest in terms of their use of mobile technologies (77.3%), use of the Internet to reduce operational costs (47.2%), regularly updating their online resources (50.9%) and having the internal resources to manage the digital aspects of their business (66%). The latter is probably due to government ICT departments being based at head offices rather than workplaces in Remote and Very remote areas.

11.4. Summary

Highly significant differences were observed between workplace types and the proportions that did and did not undertake online training, regular updating of online resources, and existence of policies and procedures in place for people working online (Figures 11.2-11.4). Government workplaces were more likely to use online training and have policies and procedures in place. This is not surprising given the resources available to this sector. What was surprising was that government workplaces were less likely to regularly update their online resources compared to respondents from business and NFP/community group workplaces. As previously mentioned, this may be because most ICT, media and marketing functions are managed at head office, rather than remote workplaces.

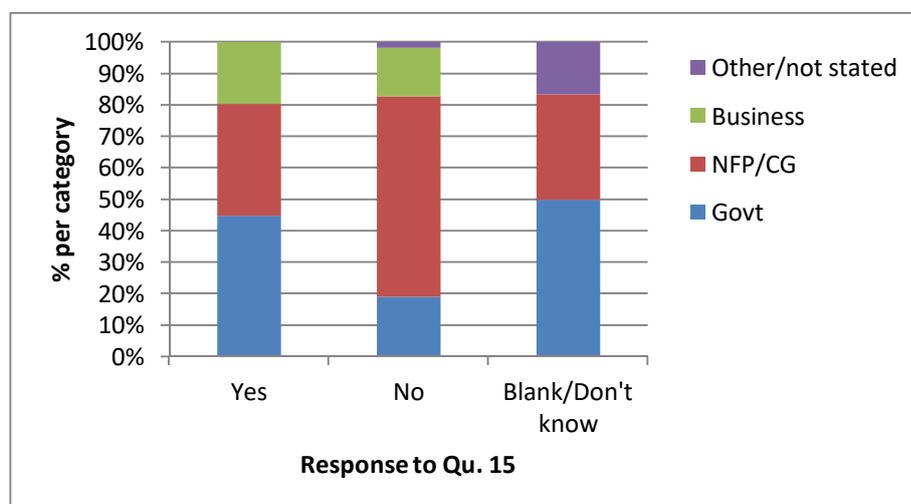


Figure 11.2. Responses to Question 15: "Does your workplace use online training programs to up-skill people?" by workplace type.

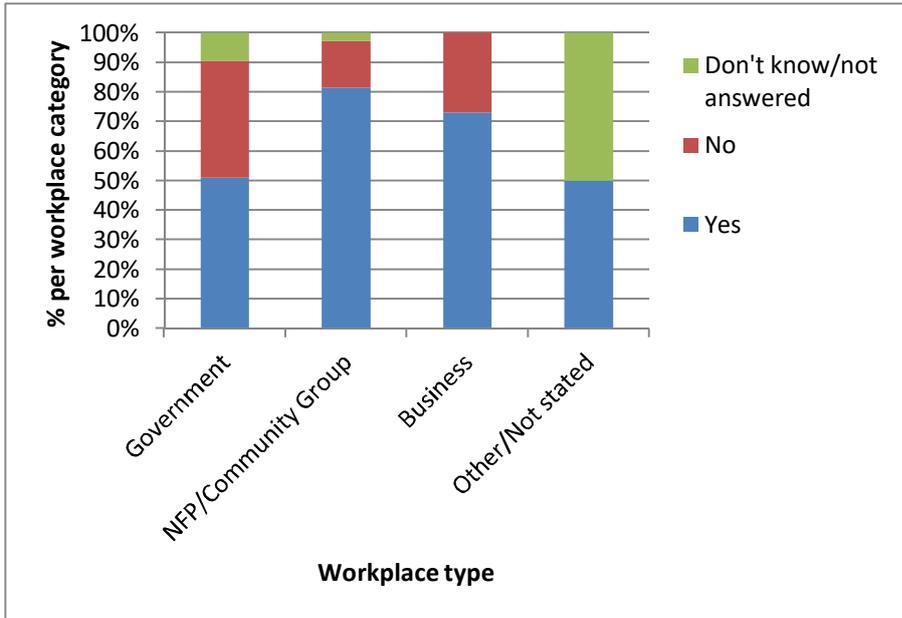


Figure 11.3. Responses to Question 13: “Are your online resources regularly updated?” by workplace type.

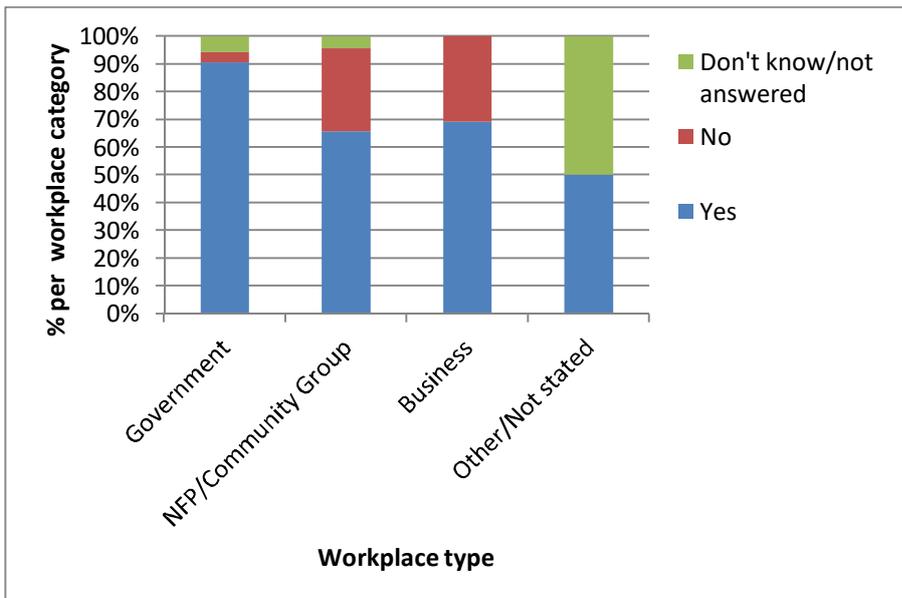


Figure 11.4. Responses to Question 20: “Does your workplace have policies and procedures for your people who are working online (e.g. relating to the use of emails or social media)?” by workplace type.

Significant differences between workplace types regarding adequate levels of Internet access were also observed (Figure 11.5), with respondents from government agencies less likely to have adequate Internet access for the applications that they used. This was not surprising given the majority of government respondents were located in Very Remote areas, which tend to have poorer telecommunications and Internet connectivity compared to capital cities.

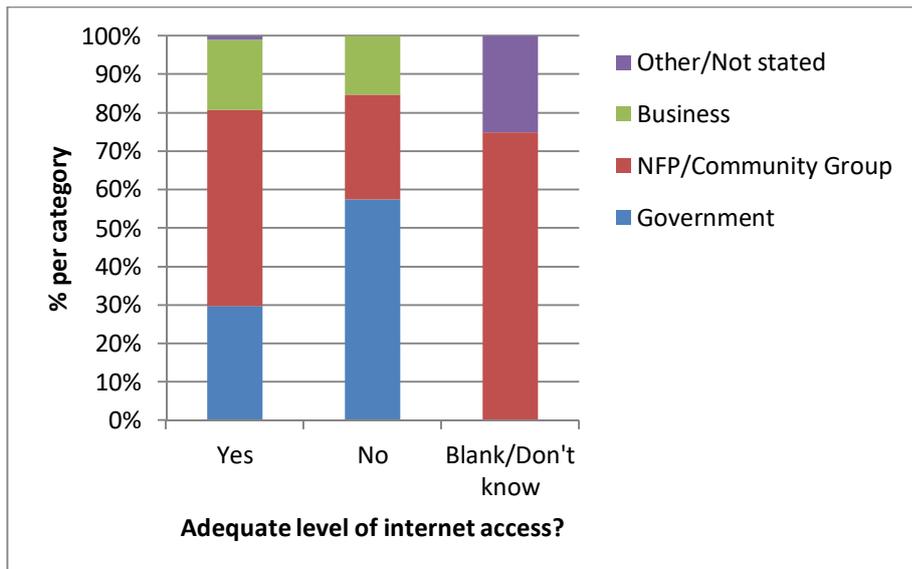


Figure 11.5. Responses to Question 6: “Does your level of Internet access enable you to adequately utilise the application you use?” by workplace type.

There were also significant differences between workplace types regarding the extent to which they used the Internet for recruitment and relied on government websites for information. Respondents from government workplaces were more likely to use the Internet as part of the recruitment process (86.6%) compared to business respondents (61.5%). A higher proportion of government respondents relied on government websites for information (93.8%) compared to NFP/community groups (76.5%) and business respondents (72%).

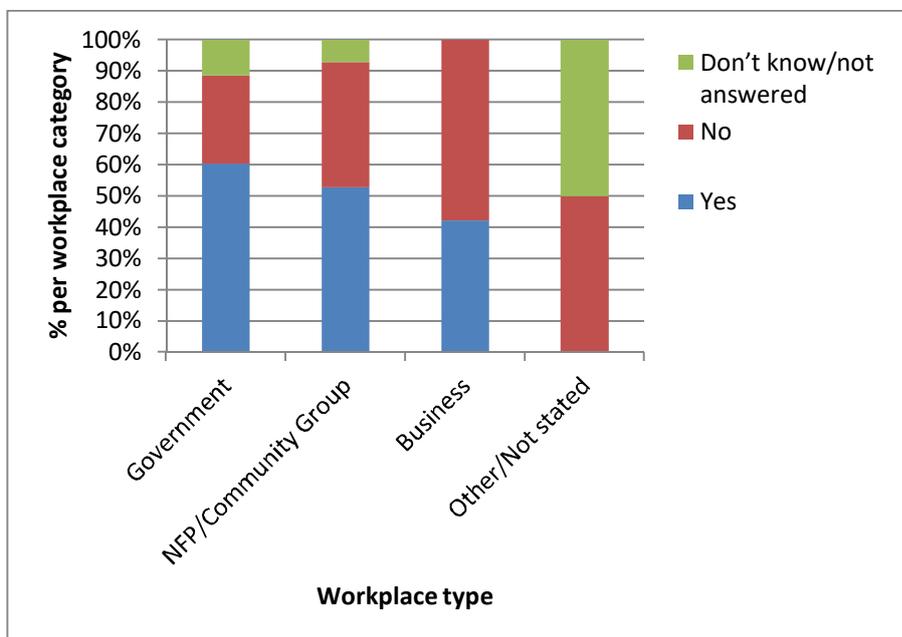


Figure 11.6. Responses to Question 25: “Does your workplace actively look to develop new services that can be delivered online?” by workplace type.

Differences between workplace types regarding the proportions that were actively developing new services that could be delivered online may be of some significance (Figure 11.6). Respondents from government workplaces were slightly more likely than respondents from NFP/community group or

business workplaces to actively develop new online services. As previously noted, these results are consistent with the service delivery role of government and Commonwealth Government aim to move services with more than 50,000 transactions per annum online.

There were no substantial differences between workplace types regarding the use of mobile technologies and devices to access and transfer data, nor proportions that undertook online training, digital training, used technology to reduce operational costs, used applications such as web and videoconferencing to reduce travel, had the capacity to internally manage the digital aspects of the business, or the existence of a digital strategy. Regardless of workplace type or location, all workplaces performed poorly in terms of digital training (less than 50%) and having a strategy to increase their digital presence (less than 57%).

Among the top five industries in the DWAT Survey, there were highly significant differences between workplace types regarding the proportions that used applications to reduce travel and the existence of internal policies and procedures for people working online. In the Public Administration and Safety sector 85% used applications to reduce travel compared to less than 50% of Arts and Recreation respondents. Similarly, 90% of respondents from the Public Administration and Safety sector said their workplace had policies and procedures in place governing online use compared to only 45.4% of those from the Arts and Recreation sector. The differences between workplace types in these industries regarding the proportions that have the internal resources to manage the digital aspects of the business may also be of some significance.

When ranking responses to Questions 5-26, respondents from government workplaces scored highest, followed by the business and NFP/community group workplaces (Figure 11.7). This suggests that their digital capacity and capability was greater than business and substantially greater than NFPs/community groups, despite the proportion of government respondents (66%) who indicated that their levels of Internet access were inadequate.

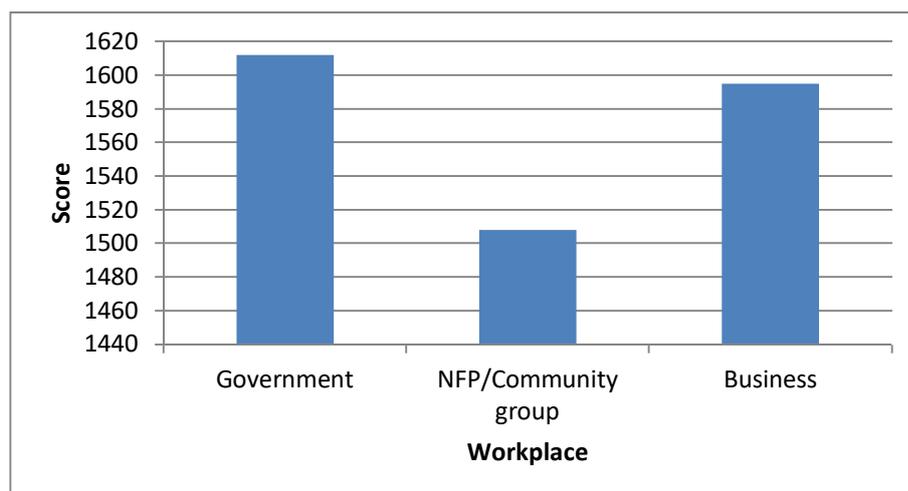


Figure 11.7. Overall digital capability and capacity scores by workplace type based on responses to DWAT survey questions 5 – 26 inclusive.

Chapter 3 noted research that indicated that the Australia NFP sector was less confident in ICT use than any other sector and that a relatively high proportion of NFPs rated themselves as 'lagging

behind' (29%) or 'in trouble' (5%).³²⁷ In the DWAT Survey, while NFP/community groups ranked lowest overall, poor performance was limited to specific issues around ICT management such as policies/procedures governing online use, cyber-security and compliance with relevant legislation. This could be overcome through targeted, sector-specific information and training. Targeted advice from professionals could also help this sector make greater use of the Internet (e.g. how to use cloud computing to reduce travel) potentially leading to greater productivity and improved service delivery.

12. Discussion and recommendations

The DWAT Survey has quantified the digital capacity and capability of workplaces in Outer Regional, Remote and Very Remote areas of the NT, providing a robust evidence base for policy development, rather than relying on common assumptions or broad state or national research. The results have implications for policy development and program delivery in the Territory, most notably that a ‘one size fits all’ approach is not appropriate and is unlikely to be effective in supporting the growth of a digital economy. Instead, policies need to address the specific strengths and weaknesses of workplaces based on type (i.e. government, NFP or business) and location (remoteness).

The DWAT Survey challenges perceptions that people in Remote and Very Remote workplaces may be less knowledgeable or skilled in terms of their ICT and Internet adoption and usage. As a group, Remote respondents scored highest compared to respondents in Outer Regional and Very Remote areas. There were no statistically significant differences between workplaces based on location (remoteness) regarding the proportions engaging in innovation, having the internal resources to manage the digital aspects of the business, using the Internet as part of their recruitment process, undertaking online training or having strategy to increase their digital presence.

For Very Remote workplaces and, at a finer-grained level, non-urban respondents, digital capacity and capability appear to have been influenced primarily by their connectivity type. This was particularly evident in relation to having adequate levels of access to the Internet to enable use of workplace applications, use of technology to reduce operational costs, and the ability to use applications such as web and videoconferencing to reduce travel. For example, while over 80% of respondents in Outer Regional areas said their level of Internet access enabled them to adequately utilise their workplace applications, this dropped to only 63% in Very Remote areas. Such findings are not surprising given the high proportion of Very Remote respondents relying on satellite connectivity. A palpable sense of frustration was evident in some of the comments from Very Remote respondents regarding their Internet speed and reliability. In this respect the results of our study echoes the experiences of consumers and small businesses elsewhere who have regularly expressed “frustration about applications they want to use and updates to their websites but are unable to do so due to a lack of reliable connection or sufficient data.”³²⁸

The DWAT Survey results highlight the inferior service that satellite currently provides and the need to continue to explore alternative backhaul solutions. The extent to which the launch of the Long Term Satellite Service ‘Skymuster’ will ameliorate some of these issues is currently unknown. Meanwhile, the ‘single solution’ policy approach of the Australian government and the NBN, which essentially locks Very Remote respondents into a satellite solution, is clearly problematic. It is also at odds with the NT Government’s aim to work towards terrestrial-based connections wherever possible. The other types of connectivity solutions used in Remote and Very Remote areas suggest that these alternative solutions are preferable to workplaces wherever they are available. Continued improvements in mobile coverage will also provide Remote and Very Remote respondents with greater choices regarding connectivity, and assist Indigenous clients and consumers who generally access the Internet via mobile devices such as smartphones.

Previous research into ICT adoption and usage by SMEs and the NFP sector described in Chapter 3 tended to suggest that small businesses were more digitally savvy than their NFP counterparts. In the DWAT Survey respondents from government workplaces scored highest overall in terms of their digital capability and capacity, followed by business and NFP/community group workplaces. Given the resources available to government (and economies of scale that the NT Government in particular can achieve) these findings are not surprising. However, the DWAT Survey also identified areas in which government workplaces scored lowest, including use of mobile technologies and devices, regular updating of online resources and, surprisingly, having adequate levels of access to the Internet to enable use of workplace applications. These findings may be explained by the proportion of government respondents in Very Remote areas, which have poorer access to telecommunications and limited access to high speed Internet.

Regardless of location or workplace type less than 50% of respondents said that their workplace undertook digital training. While the DWAT Survey did not explore the possible link between digital training and digital literacy, there were significant relationships between training, innovative use of the Internet and digital strategies. These findings indicated that workplaces that undertook online training also tended to undertake digital training, and that those workplaces that undertook digital training also tended to make innovative use of the Internet and have a strategy to enhance their digital presence. However it is not clear whether digital training is the factor driving innovative use and presence of digital strategies, or vice versa. The nature of this relationship needs to be explored in further detail.

Given these findings, the very low percentage of business workplaces (34.6%) in the DWAT Survey that undertook digital training is potentially a cause for concern. Although lack of digital training does not necessarily equate to poor digital literacy, it was noted in Chapter 3 that low levels of digital literacy and lack of confidence to adopt new technologies were significant barriers for Australian SMEs. It was also noted that most SME businesses would welcome opportunities to improve their digital literacy, provided such opportunities were designed and delivered for that sector. Research has found that most businesses wanted hands-on opportunities to try new technologies in their own workplaces. This is in contrast to government and other major sources of advice, which can only be accessed online.³²⁹ Other studies have shown that Australian businesses generally prefer to rely on sources other than government websites. Poor performance in terms of regularly updating of government websites is likely to be a contributing factor and may also explain why businesses in the DWAT Survey ranked lowest in terms of their reliance on government websites for sources of information (69.2%). Kimber and Mason found in their study that the free NBN Digital Workshops “were not effective in addressing the critical ICT skills gap.”³³⁰ Lack of awareness of the workshops, lack of time available to attend the workshops and perceived lack of relevance were all factors contributing these poor results. These examples highlight the importance of training programs designed and delivered to specifically meet the needs and aspirations of the learner group, rather than what might be most convenient for the trainers. One issue that was highlighted by the DWAT Survey, but not explored in any detail, was the extent to which digital capacity and capability is limited by gaps in basic literacy and numeracy skills of staff. In terms of developing and delivering digital skills programs this is a factor that must also be considered.

At a broad level the DWAT Survey indicated that more than 75% of workplaces in Outer Regional, Remote and Very Remote areas of the NT used mobile technologies, used the Internet to benefit clients, complied with data protection, spam and privacy laws, and had procedures in place to protect the workplace, such as regular backing up of files and maintenance of an alternative power supply. In contrast to findings from other research, which identified a self-perceived lack of knowledge/confidence amongst SME enterprises and NFPs, 74% of respondents in the DWAT Survey said they had the internal ability to manage the digital aspects of their businesses.

The DWAT Survey also suggests that Outer Regional, Remote and Very Remote workplaces compare well with those interstate regarding certain aspects of Internet use. For example, a much higher proportion of business respondents in the DWAT Survey (about 73%) said that their workplace undertook telework, compared to just under one third recorded nationally³³¹ and 53% in the Australian Capital Territory, which was the highest usage recorded of any state or territory.³³² Similarly, 67.6% of NT respondents in the NFP sector undertook telework compared to 37% recorded nationally.³³³ A higher proportion of workplaces in Remote (70%) and Very Remote (71.1%) areas in the NT tended to undertake telework, compared to Outer Regional (64.1%) areas. Nevertheless, there were workplaces in the DWAT Survey that did not undertake telework. While sector specific concerns and technological limitations clearly underpinned some decisions not to engage in telework, the number of participants who identified 'No need/not required' suggests that telework is viewed as an activity that occurs solely in order to finish work, rather than to reduce commuting times, costs or increase productivity. It has been noted previously that cultural change is required to support teleworking, for example, changing concepts of work from being place-based ("work is a place I go") to one that rests on functionality ("work is something I do")³³⁴. Future research regarding the digital capacity and capability of Outer Regional, Remote and Very Remote workplaces in the NT should explore these issues in greater depth.

Given the remoteness of the Territory it is not surprising that 75.5% of workplaces in the DWAT Survey used the Internet as part of the recruitment process. More government and fewer businesses than expected used the Internet as part of their recruitment process. Nonetheless, 61.5% of business respondents indicated that their workplace used the Internet for recruitment, compared to only 34% of businesses nationally.

Previous research indicated that between 44% and 47% of Australian business SMEs used some form of cloud computing. The DWAT Survey found that just over half (50.3%) of Territory workplaces used cloud technologies for activities such as online accounting or data storage. While the Survey did not explicitly ask respondents why they did not use cloud technologies, research elsewhere suggests that reasons include: concerns regarding data security and privacy; cost; and lack of awareness/understanding of cloud computing. Given that the DWAT Survey showed no significant differences in the proportions of workplaces using cloud computing according to remoteness, urban/non-urban locations or connectivity types, and that cloud computing is likely to play an important role in the ability of organisations to digitally transform their business, reasons for non-cloud adoption by NT workplaces should be investigated further.

NFP/community groups in Outer Regional, Remote and Very Remote workplaces in the NT also compared well with their interstate counterparts regarding other aspects of ICT adoption and usage.

While previous research noted that 92% of NFPs used the Internet and 77% used mobiles, in the DWAT Survey, 97% NFP/community groups used the Internet and 90% used mobile technologies and devices. Similarly, previous research found that 29% of NFPs felt they 'lagged behind' and 5% felt that they were 'in trouble' regarding their ICT usage. In the DWAT Survey, 80% of NFP respondents indicated that they had the internal resources to manage the digital aspects of the business. While not directly comparable, our results suggest that NFP/community groups in Outer Regional, Remote and Very Remote areas of the NT may be more confident than some of their interstate counterparts regarding ICT.

Organisational structure appears to impact upon the digital capability and capacity of some workplaces, particularly the difference between the roles and responsibilities undertaken by a head office compared to a small branch in a Very Remote location. This is most noticeable in relation to the Government sector. Not surprisingly, government workplaces scored highest overall in the DWAT Survey in terms of the digital capacity and capability. The NT Government is the largest single employer in the Territory and government, especially local government, is often one of the few workplaces present in Remote and Very Remote areas.

Just over half (52.3%) of DWAT Survey respondents indicated that their workplace had a strategy to enhance their digital presence. While there were no significant differences between workplace types or locations (remoteness), there was a strong association between having a digital strategy and digital training. DWAT data suggests that workplace size (number of employees) and industry sector may be factors, although the nature of these relationships requires further research. For example, among the top five industries in the DWAT Survey, Other Services and Healthcare and Social Services appeared to be the most proactive in terms of developing digital strategies, while the Education and Training sector was the least proactive. The proportion of respondents from the business sector with a digital strategy was 50%, which is higher than recorded by Sensis in 2014 for SMEs generally (19%) and for the NT specifically (14%) but nevertheless is still low. Clearly this is one area of workplace digital capability and capacity that should be addressed. Failure to do so will risk exacerbating existing digital divides.

In terms of innovation among the top five industries in the DWAT Survey, workplaces in the Other Services industry were the most innovative, followed by Public Administration and Safety, and Arts and Recreation, while Education and Training, and Health and Social Services were the least innovative. Workplaces in the Other Services sector were most likely to actively develop new services for online delivery, followed by Public Administration, and Arts and Recreation. In contrast, less than half of workplaces in the Health (46.1%) and Education and Training (36.8%) sectors undertook this activity. In contrast, there were no significant differences between workplaces based on location (remoteness) regarding the proportions undertaking the types of innovative activities captured by the DWAT survey. These results are consistent with the findings from the Australian innovation survey undertaken by Vitartas *et al.* who found minimal significant differences between the views of participants from regional and urban areas.³³⁵

Chapter 2 identified the industry sectors most likely to be impacted by the digital economy as the Financial Services, Telecommunications and Information Media, Retail Trade, Education, and Health sectors. In terms of timing and magnitude, some analyses suggested Telecommunications and

Information Media, Finance, Professional Services, Real Estate, Retail, and Arts and Recreation would be most impacted within the shortest time scale. While sample sizes for some of these sectors in the DWAT Survey were too small to draw conclusions, Other Services scored highest overall in terms of digital capacity and capability, followed by Public Administration and Safety, and Health, while the Arts and Recreation and Education sectors scored the lowest. These results suggest support should be directed towards the latter two sectors as a priority.

There is a widespread perception that Internet adoption can potentially reduce costs in regional and remote areas. However, the results of the DWAT Survey indicate that this potential should not be overestimated, particularly in Remote and Very Remote areas. Across the board, only 55% of all workplaces said technology had reduced their operational costs. There were no significant differences between workplace types and only minor differences according to location (remoteness) with a slightly higher proportion of Outer Regional workplaces who indicated that technology had lowered their operational costs, compared to those in Remote and Very Remote areas. These results suggest that reduction in operational costs is not likely to be a substantial driver of ICT adoption and Internet usage. It may be that other costs associated with working (and living) in these areas such as fuel, power, food and so on, are sufficiently high that they cannot be substantially mitigated by use of ICT and the Internet alone.

The proportion of respondents who used applications to reduce their travel was also not particularly high (55%). While there were no significant differences between workplace types or remoteness, significantly more workplaces in urban areas used applications to reduce travel than workplaces in non-urban areas. The potential for ICT to reduce travel should not be overstated, particularly in non-urban areas of the NT. The type and nature of connectivity in these areas would appear to be a clear barrier towards achieving a reduction in travel. In contrast, the greater use of applications by workplaces in urban areas to reduce travel is argued to reflect their access to superior (in terms of performance and reliability) connectivity options, compared to those in non-urban areas. It is also suggested that other factors including ICT affordability, digital literacy levels and attitudes towards visiting Remote and Very remote areas by those in urban areas are such that the latter may be more inclined to use applications to reduce their travel. It should also be recognised that for both Indigenous and non-Indigenous people in small communities or isolated pastoral stations with access to only a limited range of goods and services, travel outside of these areas (for whatever reason) presents an opportunity to access goods and services not usually available, catch up with friends and relatives, and so on. In these circumstances the motivation for travel by people living and working in non-urban areas of the Territory is unlikely to be entirely offset by the availability of superior internet connectivity, such as that expected to be delivered by the Skymuster service from around mid-2016. Recent research in Central Australia tends to support this view³³⁶. Accordingly, viewing travel as a disutility to be minimised, would appear to be too narrow a perspective. Clearly the relationship between ICT and travel is not simply one of substitution, but complementarity.³³⁷ Organisations that provide services to Remote and Very Remote areas should be cognisant of this and structure their Service delivery models accordingly.

The type and cost of connectivity in many Remote and Very Remote/non-urban areas also explains some of these results around cost and travel reduction. As previously noted, satellite connectivity is the dominant type of connectivity in Very Remote areas and the majority (66.7%) of satellite

respondents said that use of technology in their workplace had not reduced their operational costs. Comments from participants in the DWAT survey highlighted satellite connectivity as being costly, slow and unreliable. Its capacity to reduce operational costs and travel (through the use of web-based applications and videoconferencing) is clearly limited. Unless workplaces in Remote and Very Remote areas are given access to connectivity solutions other than satellite, the potential cost benefits associated with ICT and Internet use are unlikely to materialise. Policies and programs that are underpinned by such assumptions should be reviewed in light of these findings.

Although not specifically addressed in the DWAT survey, the affordability of telecommunications generally needs to be addressed, particularly mobile communications. This is an important issue given the higher cost of living and working in Remote and Very Remote areas, and the high proportion of Indigenous populations, which are typically disadvantaged. People in regional and remote areas already pay comparatively more for the same services enjoyed in urban areas, nonetheless more people in regional and remote areas are choosing the convenience of their mobile phone over standard land lines. This could be ameliorated with a scheme like the landline Untimed Local Calls in Extended Zones for mobile services, with voice calls capped at a local/comparable rate so that the Extended Zone tariff is technology-neutral.

It was noted in the recent Regional Telecommunications Review that government is considering how to fund non-commercial NBN services.³³⁸ The inherent inequity in the NBN model is likely to be exacerbated if potential funding models focus on wholesale providers, technology and arbitrary headline speeds. End-users outside the fixed footprint may end up having to pay for two services (i.e. broadband and dedicated phone service) in order to have equivalent communication services. Additionally, satellite end-users will have to pay extra charges associated with the connection/disconnection, relocation and repair of previously government-subsidised satellite dishes. Such end-users will not receive an equivalent service at the same price.³³⁹ Unless these issues are addressed the potential cost benefits of ICT and Internet use will not extend to Remote and Very Remote organisations.

Workplaces in Very Remote areas (about 90%) relied more heavily on government websites as sources of information, than their Outer Regional (78%) and Remote (61%) counterparts, even though only 51% of all government respondents said their workplace regularly updated their online resources, compared to 73% of business and 81% of NFP/community groups. This pattern was partially explained by the high proportion of government workplaces in Very Remote areas with head offices in major service centres. Previous research has shown that both the business and NFP sector rated government websites poorly in terms of providing relevant information, preferring email news, hands-on opportunities and workshops to experience new technology.³⁴⁰ When combined with the poor levels of adequate Internet access particularly in Very Remote areas, it is clear that there are implications for the Australian Government's shift to online service delivery. Specifically, such a move is unlikely to result in better service delivery for users in these areas unless content is directly relevant and regularly updated. Additionally, designers of government websites and apps should be aware that not all of the end-users will have access to superior broadband and greater consideration should be given to designing services for delivery using asynchronous technology. Websites, portals and apps should include cut-down versions, with minimal graphics and other bandwidth-intensive elements, so that they work for respondents reliant on satellite, rather

than time out before a transaction can be completed. While online service delivery may be cost effective for Government,³⁴¹ some research undertaken to date suggests that it is not necessarily effective on the ground³⁴². It appears that there may be an emerging policy disconnect between the Australian Government's digital transformation agenda and some end-users.

As the global digital economy continues to grow, it is critical that workplaces in the NT are in a position to manage their digital transformation and achieve aspirations, such as those documented in reports such as *Pivot North* and *Our North Our Future*. Designing a strategy for increased participation should consider the strengths and weaknesses of workplaces by type and location (remoteness) as well as areas such as digital training and digital strategies; areas in which all workplaces performed poorly. Based on the results of the DWAT Survey, a strategy for the business sector might also include, for example, innovation and developing online services, whereas a strategy designed principally for NFP/community groups might focus on cloud computing and online training. For the government sector, the strategy might focus on addressing inadequate levels of Internet access, lack of regular updating of websites and apparent lack of use of Internet to reduce operational costs.

Most Outer Regional, Remote and Very Remote NT workplaces are already in the process of transformation. While results of the DWAT Survey suggest that overall Territory workplaces have a reasonable level of digital capability and capacity, there are clearly areas that need to be addressed. Given the importance of workplaces outside the larger business centres, efforts to improve digital participation should not be restricted to the business sector, Outer regional, or main urban areas. There are significant economic, social and moral imperatives for ensuring that a digital strategy for the Territory encompasses all business, NFP/community sector and government agencies in non-urban, Remote and Very Remote areas as well.

At a broader level, the results of the DWAT Survey indicate that workplaces in Outer Regional, Remote and Very Remote areas of the NT face the following barriers to transformation, which should be addressed in any digital strategy for the Territory:

- Inadequate access, speed and reliability provided by satellite connectivity;
- Cost (affordability) of telecommunications, particularly mobile and satellite;
- Lack of strategies to enhance the digital presence of workplaces; and
- Lack of digital training programs designed and delivered to meet the needs and aspirations of the learner group.

The strategy should be underpinned by a perspective which views digital solutions (e.g. Telehealth and other online service delivery programs) as complementary to existing practices, rather than as simple substitutions. Additionally, the strategy should also provide for further research to underpin policy and program development, including:

- Drivers and barriers for teleworking;
- Drivers and barriers for cloud computing;
- The relationships between digital training, having a digital strategy, innovation, workplace size (number of employees), and industry sector; and
- How digital literacy can be improved alongside improving basic literacy and numeracy skills.

Without such a digital strategy for the NT, infrastructure and skills gaps will continue to be addressed on an ad hoc basis with the very real risk that Territorians will end up on the wrong side of the digital divide. NT workplaces will struggle to bridge this gap in order to survive and thrive in the global digital economy.

However workplaces are not the only ones to engage in a digital economy; individual end-users are also critical players. Any overarching digital inclusion framework for the NT should also address lack the above issues from the perspectives of individuals as well as issues such as lack of choice and barriers to Indigenous take-up of satellite internet and mobile phones. Findings from the recent Home Internet Project by Swinburne *et al.* regarding the latter should also inform and contribute to the development of such a framework.

Appendix A

Internet Usage

1. Is the Internet accessible where your place is located?
 2. Does your workplace access the Internet (if no, go to Q26)
 3. If yes, is the Internet access (circle as appropriate): Cable/Fiber, Satellite, Wireless, Citrix, ADSL2/2+, 3G/4G
 4. Does your workplace use the Internet for business purposes?
 5. Does your workplace use Internet reliant applications? (e.g. email, cloud services, social media, video conferencing etc)
 6. Does your level of Internet access enable you to adequately utilise the applications you use?
 7. Are there applications you would use if there was adequate Internet access? (e.g., cloud services, video conferencing etc)
- Comments: (to clarify your responses)

Technology and Resources

8. Does your workplace use mobile technologies to access and transfer data? (e.g. mobile phones, tablets, lap tops)
 9. Has the use of technology allowed your workplace to reduce operational costs?
 - 9b. (Optional) – Please provide an estimate as a percentage of savings eg technology has reduced our costs by 20%
 10. Is your workplace using technology to benefit your clients?
 11. Does your workplace use applications to reduce travel such as web and videoconferencing?
 - 11b. If no, why not?
 12. Does your workplace use cloud technologies (e.g. online accounting, data storage)?
 13. Are your online resources regularly updated (website, facebook etc)?
- Comments (to clarify your responses)

People

14. Do people in your workplace use your technology to do work from home?
 - 14b. If no, why not?
 15. Does your workplace use online training programs to up-skill people?
 16. Does your workplace undertake digital training (e.g. digital media, digital marketing, or e-commerce training)?
 17. Does your workplace have the ability to internally manage the digital parts of your business, such as your website and facebook?
 18. Does your workplace use the Internet to assist with recruitment processes?
- Comments (to clarify your responses)

Services, Compliance and Security

19. Does your workplace rely on Government web sites for up to date information? (e.g. in relation to programs or compliance)
 20. Does your workplace have policies and procedures for your people who are working online (e.g. relating to the use of emails or social media)?
 21. Do you believe your workplace complies with data protection, spam, and privacy legislation?
 22. Does your workplace have procedures in place to protect your workplace (e.g. regular backing up of files, maintenance of an alternative power supply)
- Comments (to clarify your responses):

Innovation

23. Does your workplace use technology to identify new markets, services or products?
 24. Does your workplace have a strategy to build its digital presence?
 25. Does your workplace actively look to develop new services that can be delivered online?
 26. Does your workplace believe reliable Internet access is essential to your workplace?
- Comments (to clarify your responses):

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