strategic networks group

the broadband economists

October 2010

e-Strategy Report – North Carolina

Prepared for:

e-NC Authority

Strategic Networks Group, Inc.

1300 Richmond Road, Suite 402, Ottawa, Ontario, K2B 8L2 • Canada

☎ +1.613.277.2588 • www.sngroup.com

Table of Contents

List of Figures

1. Key Points

A. The Internet and broadband are key economic growth factors for North Carolina.

In North Carolina, over a 12-month period, 17.5 percent of new jobs created by the sample businesses and organizations can be attributed to using the Internet. This is even more significant for businesses with less than 20 employees where 28 percent of new jobs are attributed to using the Internet. Small businesses have a disproportionate ability to generate new jobs, especially those created through using the Internet.

Figure 1: Importance of Internet in Job Creation: by Size of Employer Group

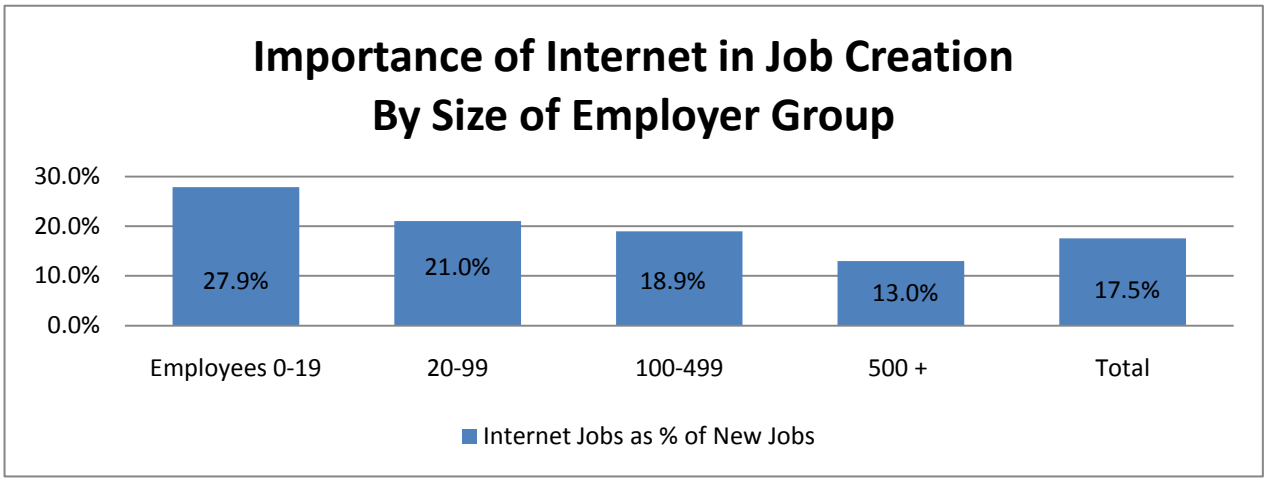
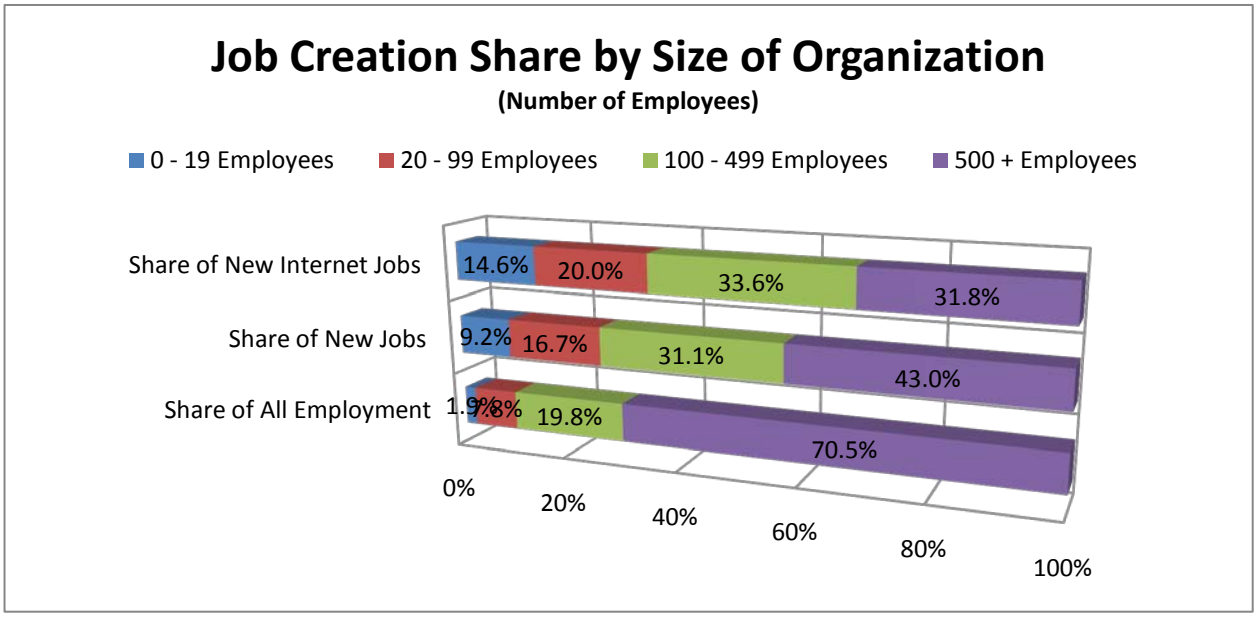


Figure 2: Job Creation Share by Size of Organization

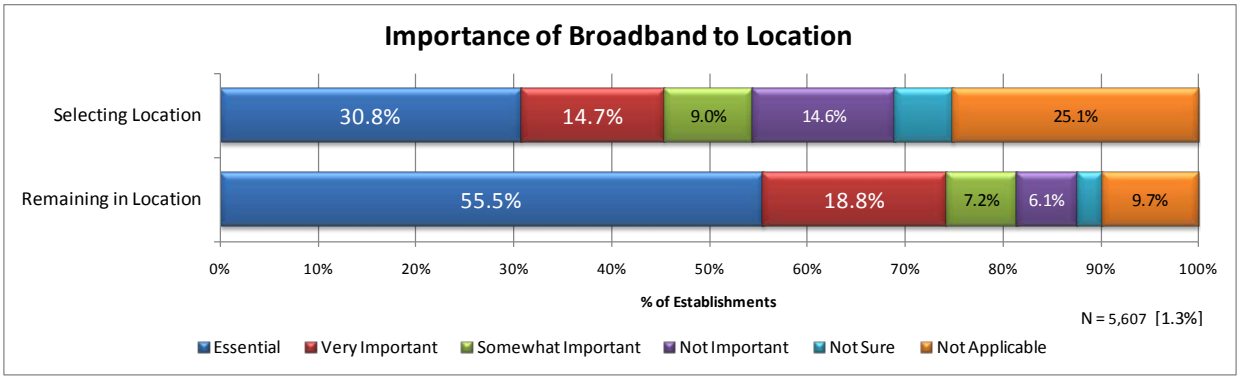


B. Gaps in broadband availability have increasingly negative economic and social development consequences, whether in unserved communities or broadband coverage areas with unserved pockets.

Of the 405 county and municipal government respondents that participated in the e-Solutions Benchmarking, 54 percent indicated that they had been asked about broadband availability. Twenty-six percent indicated that the availability of broadband had been a factor in attracting businesses to their area. Also, 17 percent to 22 percent of respondents stated that businesses have relocated away or chose not to locate in their area because of the level of broadband. These respondents came predominantly from rural counties (18 out of 21 cases of relocation away; and 21 out of 24 decisions not to locate in their area).

The experience of municipal and county government officials is echoed in the high percentage of businesses and organizations who indicated that availability of broadband is an essential or very important factor in where they choose to operate.

Figure 3: Importance of Broadband to Location Decisions



Moreover, broadband is very important for the choice of living location for 41 percent of households. This reinforces the responses for the likelihood of relocating to another community to obtain broadband service.

These findings statistics demonstrate the growing importance of high quality broadband in attracting and retaining businesses, organizations and populations within communities.

C. The Internet has become an important component to the revenue of businesses and other organizations. The following chart shows revenues that include direct Internet sales (online) and income enabled by using the Internet to interact with customers.[1]

Figure 4: Revenue Impacts from Internet Use

Size of Organization by Number of Employees	Average Revenue per Organization	Average Revenue from Internet Use	% Revenue from Internet
0–19	1,284,576	231,824	18.0%
20–99	8,603,014	1,207,238	14.0%
100–499	38,542,168	6,335,703	16.4%

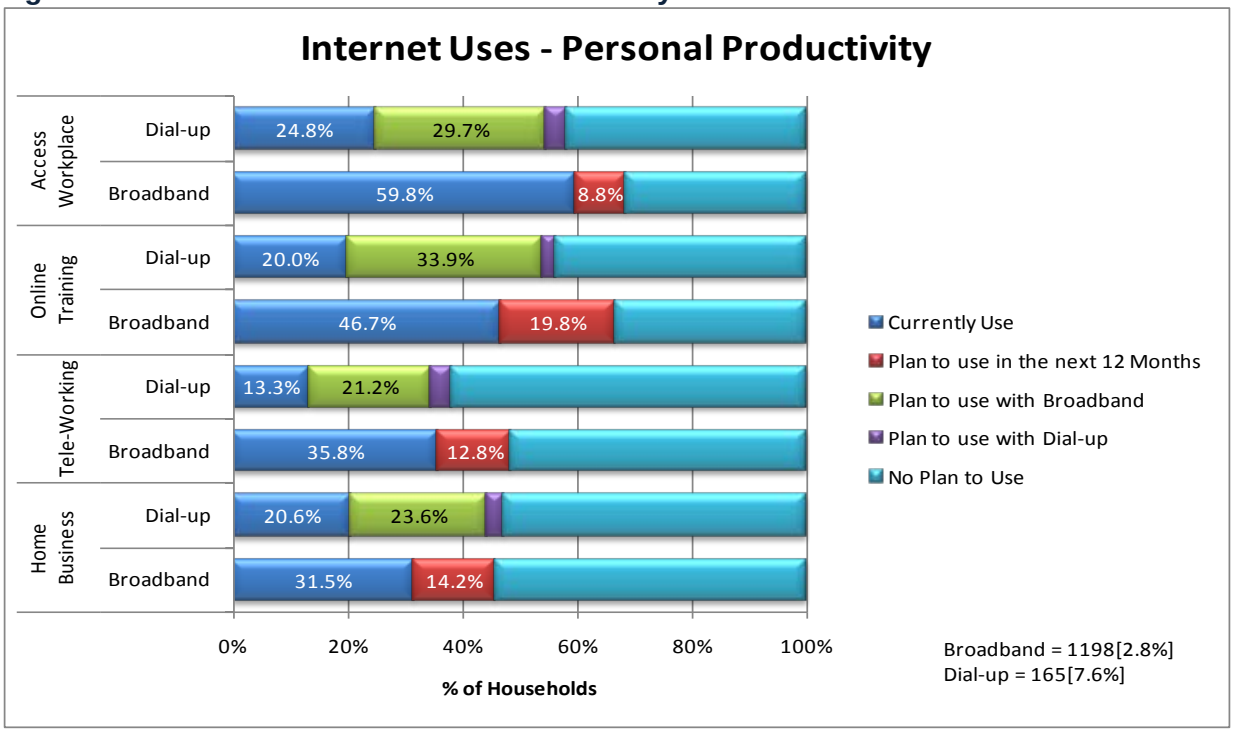
Benefits from broadband can more quickly be realized with awareness and adoption campaigns that identify gaps in utilization and that link to support resources (local and

1 Organizations were asked to consider revenue from using the Internet includes any direct sales of products or services to clients online and how using the Internet contributed to increasing revenues through their ability to reach and acquire new clients through other online activities, such as marketing and promotion, developing client relationships, client communication, and improved methods and efficiencies for interacting with clients.

online). Supporting businesses and organizations can accelerate the adoption curve and realize productivity benefits more quickly. High adoption rates improve competitiveness, quality of service and local economic development opportunities.

Not only are economic benefits seen at the business or organizational level, but availability of broadband at the household level also has significant economic impacts. A surprisingly high percentage of households currently use broadband to run a home business (31.5 percent) or to telework (35.8 percent). A sizeable portion of households also plan to start using broadband in the coming year for either a home business (14.2 percent) or for teleworking (12.8 percent).

Figure 5: Internet Uses for Personal Productivity



2. Introduction

This *e-Strategy Report* explores the implications of the e-Solutions Benchmarking results for strategic planning for broadband in North Carolina, as well as for policy and program development. This report is a companion document to the *e-Solutions Benchmarking Technical Report* on the survey-based research carried out by Strategic Networks Group for the State of North Carolina.[2] The primary research conducted by Strategic Networks Group (SNG) collected

[2] The full report on the survey can be found in ***e-Solutions Benchmarking – Technical Report (October 2010).***

information from 1,492 households and 6,266 businesses and organizations in North Carolina in May 2010. The SNG e-Solutions Benchmarking survey collected evidence on the utilization of broadband and e-solutions, as well as connectivity patterns.

The Strategic Networks Group study was commissioned by the e-NC Authority (e-NC), as part of its on-going efforts to develop high speed Internet as a tool for helping people improve their quality of life in the State of North Carolina. Funding for the e-Solutions Benchmarking was provided as part of a grant to e-NC by the National Telecommunications and Information Administration of the U.S. Department of Commerce.

3. Background

e-NC, and its predecessor the Rural Internet Access Authority, have worked to improve both the supply and demand side of the broadband issue since 2001. e-NC has collected significant data on connectivity through its Citizens' Surveys and its infrastructure mapping efforts. Two key documents arising from this work are the Baller Herbst Report (*Bigger Vision, Bolder Action, Brighter Future: Capturing the Promise of Broadband for North Carolina and America – 2008*) and the periodically updated *County Connectivity Data and Rankings – 100 County Report.*

Work by e-NC to date has focused on the absence of high speed Internet in significant portions of the State.

> Like the power companies of a century ago, the major communications providers are focusing first on their most lucrative markets and are leaving less profitable communities behind. In the areas that are least attractive to these companies – rural and low-income urban areas – they are either not providing broadband at all or are limiting their offerings to low-capacity technologies such as Digital Subscriber Line (DSL) and Cable Modem Service (CMS).
> Baller Herbst. p. 2.

The Baller Herbst Report comments on the lack of robustness of broadband currently being deployed and notes that this approach runs the risk of placing the U.S. and individual states in an uncompetitive position, globally and nationally.

The North Carolina e-Solutions Benchmarking was initiated to supplement previous work by providing a solid factual basis for understanding broadband adoption and utilization in the State, especially among businesses and non-commercial organizations which had not previously been surveyed. Drawing directly on the experiences of businesses, organizations and households in the State, the e-Solutions Benchmarking provides solid evidence of which broadband enabled

applications and processes are utilized, what types of benefits can be derived, and what barriers exist to effective adoption. This *e-Strategy Report* builds on the results of the e-Solutions Benchmarking as well as previous analysis to identify policy and program options that respond to the specific circumstances of North Carolina in 2010. The purpose of the report is not to set strategic priorities for the State of North Carolina or e-NC, but rather to provide strategic options that address the gaps, barriers and opportunities identified through the SNG e-Solutions Benchmarking for the State of North Carolina.

4. Implications of e-Solutions Benchmarking for Strategies, Policy and Programs

Strategic plans are guided by a clear sense of purpose, usually articulated in the form of specific goals. Building on the past and present work being carried out by e-NC, this report develops its e-Strategy around the concept of Community Return on Investment (Community ROI).

Community ROI is a composite of distinct benefits received by businesses, organizations and households, as well as collective benefits such as less pollution and good public governance. The following strategic goals can be identified within the Community ROI framework.

a) **Quality of Life:** The overriding goal of public investments is to improve the quality of life of residents and their communities. Maintaining this holistic perspective is important in strategic planning for broadband where a range of different perspectives and interests exist. Traditionally, quality of life is seen to incorporate and integrate the requirements for a fulfilling and productive life: meeting basic needs which include the financial means to acquire shelter and food; full participation in the life of the community (social, cultural and

> The dynamic force in [the current stage of globalization]-the thing that gives it its unique character – is the newfound power for individuals to collaborate and compete globally. And the lever that is enabling individuals and groups to go global so easily and so seamlessly is not horsepower, and not hardware, but software – and all sorts of new applications – in conjunction with the creation of a global fiber optic network that has made us all next-door neighbors. Individuals must, and can now ask, "Where do I fit into the global competition and opportunities of the day, and how can I, on my own, collaborate with others globally. *The World is Flat*, Thomas Friedman, pp 10–11.

recreational); and participation in the civic life of the community and greater society.

b) **Equity and Access**: In the context of broadband, equity and access can be seen in the ability of citizens and organizations to access and afford broadband service, as well as their ability to access the services and opportunities provided through use of high speed Internet. Examples of Internet-enabled services include, but are not limited to, education, training and health services. Internet-enabled opportunities would include the ability to gain income through entrepreneurial activities or teleworking.

c) **Increased productivity** for all participants in the North Carolina economy, commercial businesses, nonprofits, government entities and households. Increased productivity can be defined as producing a given level of output with fewer resources (inputs). Outcomes of increased productivity can usually be measured through financial savings or increasing goods/services within a fixed budget.

d) **Innovation and adaptability** to changing systems and markets is critical to the health of the regional economy.

e) **Greater competitiveness** for North Carolina businesses in a globally competitive world is a core goal that is enhanced by increasing productivity, innovation and adaptability.

f) The end result or desired economic outcome is **increased economic activity** as measured by job creation or revenue generation.

This *e-Strategy Report* explores how the findings of the *e-Solutions Benchmarking – Technical Report* can be applied to these policy goals.

4.1 BROADBAND CONNECTIVITY

The broadband connectivity issue, as documented in SNG's e-Solutions Benchmarking, has four distinct components.

- Unserved communities
- Unserved pockets within "served" communities
- Uncompetitive broadband: broadband that is not competitive with other jurisdictions in terms of speeds and reliability
- Mobile broadband

These terms are not used in the same manner in which the National Telecommunications and Information Administration defined these terms for program delivery. This report takes the position that the terminology needed to describe the status of connectivity in a community or

region should adjust to reflect the changing realities in the US. The use of such terms as "unserved" should not be constrained by the past requirements of a specific funding program.

Unserved Communities: With the vast majority of businesses and organizations (97 percent) reporting that they have Internet connectivity, unserved communities are primarily composed of residential areas, both rural and low income. These areas have been the focus of federal stimulus funding. In addition to the impacts on individual households, there are two significant dimensions to the dilemma faced by unserved communities. First, the higher the percentage of areas having broadband connectivity, the greater is the disadvantage experienced by the remaining unserved communities. e-Solutions Benchmarking data show a pronounced tendency of businesses and households to make decisions on where to locate or live based on the availability of high speed broadband. Second, a large percentage of economically active households use their home to generate income, either through teleworking (35 percent of households with broadband currently and another 12.8 percent projected for next year) or home-based businesses (31.6 percent currently, 14.2 percent projected for next year). *With economically active households making locational decisions with connectivity in mind, rural areas without broadband risk losing economically active households, with major negative impacts on their long-term sustainability.*

> Thirty-nine percent of households would very likely relocate to another community if broadband was not available. Over 55 percent of organizations say that broadband is essential for remaining in their current location.
> SNG Technical Report

Unserved Pockets within Served Communities: These areas are primarily low-density residential areas, usually rural or low income. Evidence for this issue emerged primarily through follow-up interviews that SNG conducted with businesses claiming that lack of broadband is a critical issue for them. Mapping efforts have been useful in identifying unserved communities but may be less effective at identifying the pervasive but smaller unserved areas within "served" communities. These low-density areas provide a poor business case for infrastructure investments by current Internet Service Providers. Small areas are less likely to be the focus of infrastructure funding programs. *As current efforts have their desired impact of reducing the number of unserved communities, it can be anticipated that a larger portion of unserved households will fall within this category of "unserved pockets within served communities".*

> As e-NC's data show, independent and cooperative telephone companies have stepped up to this responsibility, but the major communications providers have focused on serving only the most lucrative portions of their marketing areas. We therefore recommend that the e-NC Authority work with the N.C. General Assembly to find ways to encourage the major communications providers to complete their buildouts."
> Baller Herbst, p. 10

Uncompetitive Broadband: A significant portion of existing broadband infrastructure consists of relatively low-speed technologies. Fifty percent of the respondents to the SNG e-Solutions Benchmarking who took the speed test had upload speeds of less than 700kbps. As well, a significant portion of respondents indicated that they were unsatisfied with the speed and/or reliability of their broadband connection. This was especially true for satellite and "air card/cell phone" service. This level of dissatisfaction can be expected to increase as reliance on Internet increases (as demonstrated in the e-Solutions Benchmarking) and the gaps between levels of service increases between highly served and poorly served areas. Related to the reliability issue, the availability of redundancy will become increasingly important to those businesses and organizations for which the Internet is essential to their operations. For these organizations, availability of reliable service and redundancy will play an increasingly large role in their location decisions. For many of these, reliability will likely become more important than increased speed, especially once a minimum threshold has been achieved. *The issue of "competitive broadband" will likely continue well into the future as upgrades to infrastructure are required to maintain competitiveness globally and regionally.*

> ... States are emphasizing the needs of unserved or underserved rural and urban areas, but they are only focusing on low-speed technologies. Even if these states are successful in achieving their limited goals, they will not narrow the digital divide between the United States and the leading nations in affordable access to high-capacity networks, nor will they enable America's rural and urban areas to compete successfully with their counterparts abroad."
> Baller Herbst, p. 55

Need for Mobile Broadband: The e-Solutions Benchmarking demonstrated that an increasing segment of organizations and businesses rely on mobile Internet, with 32 percent of organizations and businesses considering it essential to their operations. The use of mobile devices and applications for "untethered access" is expected to continue to grow and become increasingly integrated into how organizations use the Internet. However, mobile broadband also faces important challenges. Due to relatively high costs and "caps" on usage, mobile broadband is often a flawed means of providing broadband to heavy users and those in areas with unreliable service. Moreover, development of mobile services has occurred in a parallel and separate manner to broadband, with limited coordination and efficiencies. The convergence of data and voice technologies allows greater integration of the two telecommunications functions. For the preceding reasons, *planning for expansion or enhancement of broadband should see mobile Internet infrastructure as key element of "competitive broadband".*

> ***Strategies and Solutions:*** The following are approaches to address the issues identified in the area of connectivity.

Unserved communities:

a) Continue to use mapping to identify unserved communities.
b) Promote new broadband infrastructure to serve these areas.

c) Promote higher-end infrastructure such as fiber or at least the most-robust iterations of cable and DSL.
d) Strongly promote network design that incorporates redundancy and mobile web capabilities, such as 4G cell phones.

Unserved pockets within served communities:

a) Map and document unserved areas within served communities.
b) Explore avenues for encouraging existing providers to expand their infrastructure into these unserved areas.
c) Assess opportunities for small-scale local wireless solutions, including wireless mesh networking approaches[3]. Support local wireless solutions where deemed viable, either through technical or financial assistance.

Uncompetitive broadband:

a) Develop mechanisms that encourage incumbent providers to upgrade existing "low speed" or poor-reliability infrastructure. These mechanisms should not be seen as "one time" efforts, but rather part of an on-going process for upgrading infrastructure in a manner that is equitable across the State.
b) Identify high-utilization areas or clusters that may make a business case for private-sector investment, but were missed because 'they are under the radar' of the carriers.
c) Encourage fiber infrastructure wherever possible.
d) Develop redundancy within networks, especially in town centers. Where the business case does not provide a rationale for investing in community-wide redundancy, consider supporting the development of local backup centers that can be used for short-term service interruption (in case of power failure, or interrupted IP supply).

Mobile broadband:

a) Extend mapping efforts to track infrastructure capable of supporting mobile Internet access.
b) Encourage mobile wireless Internet Service Providers and telecommunications companies to extend 3G and 4G capabilities to areas currently without such service.

[3] "Wireless mesh architecture is a first step towards providing high-bandwidth network over a specific coverage area. Wireless mesh architectures infrastructure is, in effect, a router network minus the cabling between nodes. Mesh architecture sustains signal strength by breaking long distances into a series of shorter hops. Intermediate nodes not only boost the signal, but cooperatively make forwarding decisions based on their knowledge of the network. Such an architecture may with careful design provide high bandwidth, spectral efficiency, and economic advantage over the coverage area." Wikipedia

4.2 ADOPTION AND UTILIZATION STRATEGIES

> The benefits rated as the most important by organizations were: ease of operations (73.9 percent of respondents citing this as a very important benefit); improving customer service (73.6 percent); improving resource efficiency (71.8 percent); reaching new customers (65.6 percent).
> SNG Technical Report

Simply having high-speed connectivity is not sufficient to generate the potential and desired benefits from deployment of broadband. Organizations and households need to move from simpler, early-adoption applications to more complex applications, while also transforming processes to take advantage of opportunities for more efficiency. As the e-Solutions Benchmarking clearly demonstrated, the most-important benefits reported by both commercial and non-commercial organizations were increases in productivity, quality of customer services and ability to reach new customers. Lower costs and increased revenues were next in importance.

The SNG e-Solutions Benchmarking findings also show that most businesses and organizations naturally increase their utilization of broadband enabled applications and processes over time. However, the e-Solutions Benchmarking also found evidence that some sectors or groups tend to lag in the adoption process. Some of these sectors are important engines of economic growth or institutions for public service delivery. This section identifies who needs help and strategies for assisting them in adopting and benefiting from broadband.

4.2.1 Who Needs Help

Evidence from the North Carolina e-Solutions Benchmarking is consistent with other e-Solutions Benchmarking projects carried out by SNG. When supplemented by research carried out by the Pew Research Center, three groups stand out as most likely to benefit from or need support in adopting broadband-enabled applications or processes.

a) Small organizations, both commercial and non-commercial: the overwhelming majority (97 percent in the SNG e-Solutions Benchmarking[4]) of businesses, municipal and county governments, and nonprofit organizations already use high speed Internet. The most-consistent variable in how frequently or intensively organizations use broadband-enabled processes and applications is the size of the organization. Small organizations, whether commercial or non-commercial, have significantly lower broadband utilization in teleworking, staff training, delivery of services and rich media content, supplier coordination, advertising online and customer service.

b) Home-based businesses: as an extension of the above point, home-based small businesses generally have even lower utilization of broadband-enabled applications and

[4] SNG made an effort to contact businesses that did not have an Internet connection. A list of businesses without an official business Internet address was obtained. Of 172 contacts made from this list, only 13 respondents did not in fact use the Internet for their business.

processes than other small businesses. Only 49 percent of home businesses advertise online, compared to over 63 percent of other small businesses. Similarly, the use of websites by home businesses at 53 percent is lower than other small businesses (83 percent). Lastly, home-based businesses are more likely than regular businesses not to have access to broadband (9 percent of home-based businesses versus 1.5 percent for all types of businesses).

c) Older, lower income and minority households have lower adoption rates than the rest of the population.[5] A key concern over non-adopters is that they will be unable to access services that are increasingly being provided exclusively over the Internet. While those already using the Internet may face challenges, the SNG e-Solutions Benchmarking demonstrates that these households access the Internet frequently, even if they profess not to be knowledgeable users. The e-Solutions Benchmarking also showed high levels of interest in learning to use broadband connections for such services as home-based health.

> The more knowledgeable and confident people are in using the computer, the more frequently they use the Internet. However, even 60 percent of those who know little about computers access the Internet on a daily basis.
> SNG Technical Report

4.2.2 Broadband Adoption Challenges

Consistent with other research, the North Carolina e-Solutions Benchmarking identified security, privacy and costs as the most-frequently cited barriers to further adoption of broadband-enabled applications and processes. The e-Solutions Benchmarking showed that these issues are in part related to the lack of expertise available to many organizations in dealing with security or in identifying and implementing cost-effective solutions. The e-Solutions Benchmarking also showed that most organizations initially utilize broadband-enabled applications and processes for internal functions and are slower to adopt service-delivery processes and applications that are more complex or delivered to households in their homes.

To the extent that expertise is required to overcome barriers faced by organizations and households, the overwhelming majority of respondents indicate that they prefer acquiring information and skill development through such means as online research, courses, tutorials and webinars. Face-to-face classroom training is the lowest-rated means of skill acquisition.

A related issue concerns how to access organizations and households seeking knowledge and skill acquisition. Security and trust are key issues in attracting online users. This point was underlined during the North Carolina e-Solutions Benchmarking, where the response rates to

[5] The most recent Pew Center survey (2010) found evidence of increased adoption among African American households, but not among older Americans.

survey invitations were greatly enhanced when a stakeholder was used to approach the prospective respondent.

The e-Solutions Benchmarking provides evidence that residential consumers with Internet access are open to utilizing the Internet for new applications that are still largely not available from providers. Over 91 percent of households use the Internet for online transactions, providing strong evidence of readiness to use the Internet for services delivered online.

For households not using the Internet, the perceived lack of relevance of the Internet is the dominant factor deterring adoption, followed by cost. This is especially true for households with elderly individuals. The perceived lack of relevance of the Internet to many households parallels the low utilization of the Internet by service providers to deliver health and human services to people in their own homes.

> One-in-five American adults (21%) do not use the Internet or email from any location, and a majority of these non-users have little exposure to the online world…roughly half (48%) of non-Internet users cite issues of relevance when asked why they do not go online. One-in-five (21%) point to issues related to price while 18% cite usability issues and 6% point to access or availability as the main reason they do not go online."
> Pew Research Center – Home Broadband 2010.

To provide insights into the challenge presented by those without much computer literacy or access to the Internet, post-survey interviews were conducted with community institutions in North Carolina who work with lower income and elderly households. These institutions strongly advised that natural support networks play a major role in any initiative targeting households that currently do not access the Internet. The point was made that these natural support networks vary by community. In some communities the library may play a key role. In others, seniors' centers, community centers, and churches may be more effective, especially where they already form part of the activity patterns of the target households. Natural support networks can be used to provide access (Internet stations), Internet training and support.

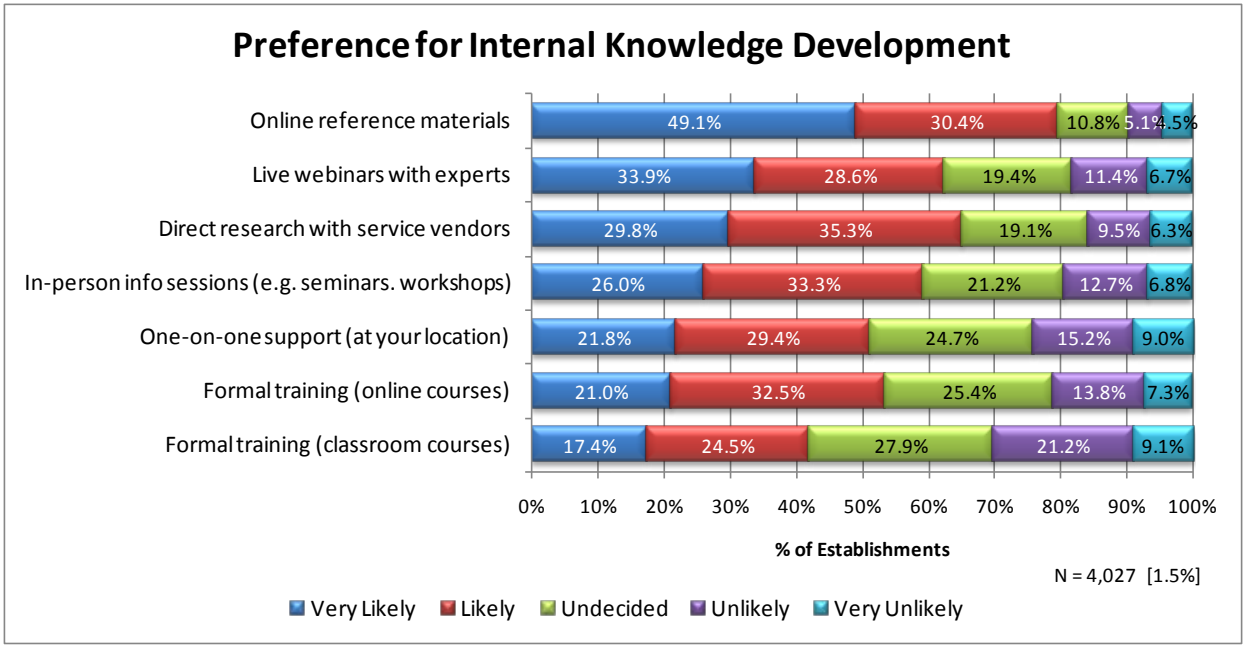
4.2.3 Broadband Adoption Opportunities

The e-Solutions Benchmarking found evidence that organizations are working hard to develop the skills needed to adopt and benefit from their Internet connectivity. Within the next 12 months, 65 percent of organizations plan to acquire at least two distinct skills sets. The most frequently cited skills are in technical areas: IT systems and applications and technical support. However, over 20 percent of organizations recognize the need to acquire project management and customer support skills to support the development and use of e-solutions.

Self-directed methods of knowledge development, such as online research and webinars, are most likely to be used by the majority of organizations. Notably, formal training methods are less

likely to be used, with in-person classroom training the least likely method and unlikely to be used by over 30 percent of organizations. This information is useful in determining the most appropriate methods to support organizations in developing the expertise they require for e-solutions adoption skills.

Figure 6: Preference for Internal Knowledge Development



In order to understand the extent to which organizations will actually acquire or use training resources, they were asked how they had actively acquired the expertise and knowledge for e-solutions. Based on practices over the past 12 months, the e-Solutions Benchmarking shows that 44 percent of organizations are likely to train existing employees and 53 percent of organizations are likely to use formal online-training courses for skills development, creating a demand for formal online-training courses. Similarly, 24 percent of the 65 percent of organizations planning to acquire skills in the next 12 months may do so by hiring new employees, creating potential job creation in over 15 percent of organizations from broadband and e-solutions adoption.

Strategies for Broadband Adoption: Building on the evidence provided by e-Solutions Benchmarking and post-survey interviews, the following strategies should be considered in any initiative to promote adoption of broadband and broadband-enabled applications and processes.

a) In designing broadband-adoption initiatives, priority should be given to households that currently do not utilize the Internet, as well as small commercial and nonprofit organizations.
b) Initiatives targeting households that either do not use or rarely use the Internet should utilize existing community networks and anchor institutions.

c) Adoption initiatives targeting households should emphasize content that is attractive to the target group, rather than basic computer or Internet literacy.
d) Public service providers, especially health and human services, should be encouraged to develop content and services for use in personal residences.
e) Emphasis should be given to development of online resources that assist small businesses and organizations and households to acquire knowledge and skills required to adopt both basic and advanced Internet applications and processes.
f) Broadband adoption initiatives for commercial and non-commercial organizations should emphasize peer-to-peer networks and cost-effective collaborative solutions.
g) Broadband adoption initiatives should consider utilizing existing stakeholders to access target groups.

4.3 MAXIMIZING BENEFITS OF BROADBAND INVESTMENTS

The North Carolina e-Solutions Benchmarking documents the types of benefits that can be expected from investments in broadband infrastructure and broadband adoption. Understanding these benefits can be a critical element in justifying and targeting broadband investments.

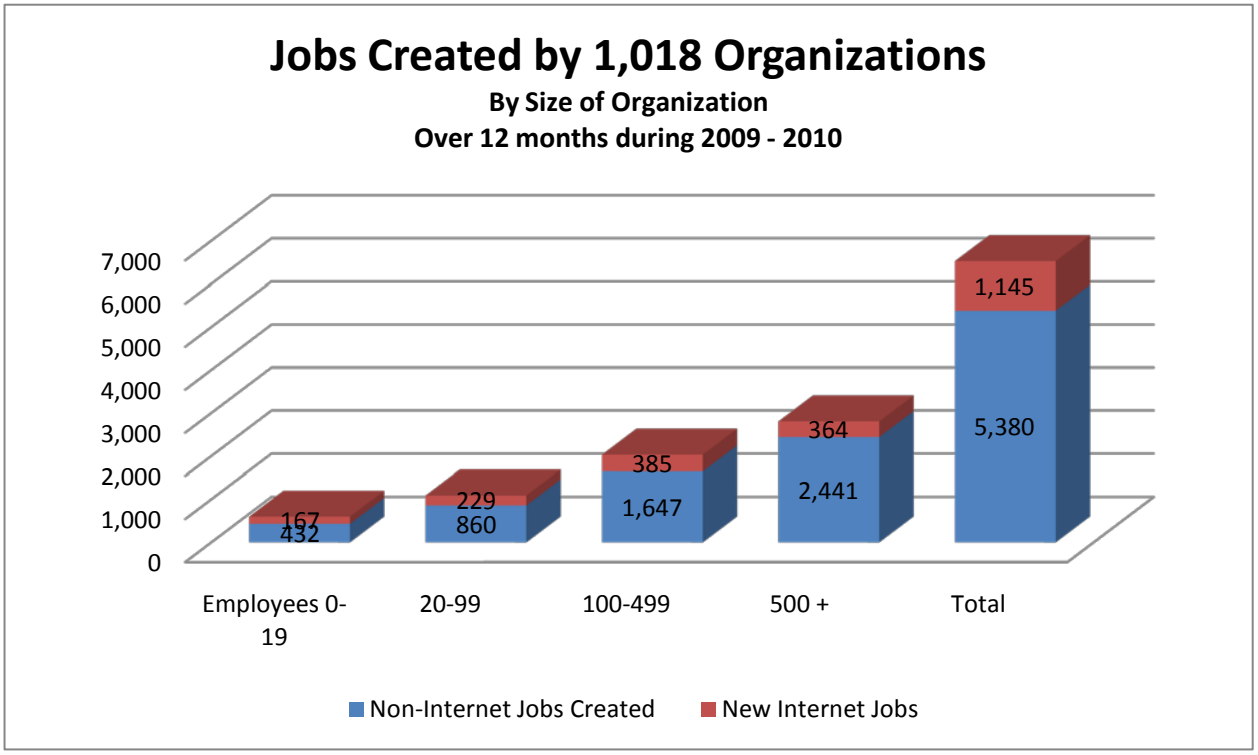
Productivity, customer reach, cost savings and competitiveness are all areas where commercial organizations stated that broadband adoption had the greatest impacts, with between 64 percent and 75 percent of businesses stating that these impacts were very important to them. A logical implication of these findings is that investment in broadband is a critical element in any strategy to promote competiveness and job retention.

Smaller organizations show significantly greater benefits from e-Solutions adoption in terms of revenues, operating expenditures, capital expenditures and job creation. Almost 28 percent of new full-time positions in businesses with less than 20 employees is attributed to growth from using the Internet. While smaller organizations tend to lag in utilization, they show higher levels of planning for utilization, indicating a tendency for smaller organizations to try and catch up with larger organizations over time.

Employment Creation: The most visible economic impact of broadband adoption in North Carolina in the last year was in job creation, especially in the small business sector. Out of 1,018 organizations reporting employment impacts 17.5 percent of new full-time jobs created were attributed to the use of the Internet[6]. The implication for policy makers is that broadband investments, both infrastructure and adoption, are a powerful tool in economic development and job creation. Moreover, focusing on the adoption of advanced broadband applications by small businesses is likely to have the biggest return on investment.

[6] Organizations were asked to identify how many new jobs created can be attributed to using the Internet by considering the difference to job creation if their organization did not use the Internet.

Figure 7: Job Creation by Size of Organization



4.4 SECTORS

The North Carolina e-Solutions Benchmarking included specific questions targeted at three distinct sectors: health service providers, municipal and county governments, and nonprofits. The responses to these questions provide a unique insight into key policy and planning issues facing each of these sectors. ***It is important to note that a common theme across all sectors is the disadvantages faced by smaller organizations that lack the resources to adopt many of the broadband-enabled applications and processes that produce the greatest productivity gains.***

Health: The e-Solutions Benchmarking established that adoption of electronic health records (EHR) is occurring rapidly among larger health institutions. Adoption of other telehealth applications and processes is occurring, though at a slower pace. However, adoption of EHR and other telehealth applications was notably lower for smaller practices. In addition, telehealth services to patients in their homes were among the slowest areas of adoption even though the majority of households recognize the benefits of telehealth services and do not consider "use of technology" as a major barrier.

Strategic Implications:

a) The State and health networks should develop avenues to encourage and support smaller health providers in their adoption of EHR and telehealth services.
b) The State and health networks should actively explore ways of expanding use of telehealth services to patients in their homes.

Municipal / County Government: The municipal and county governments show a high level of adoption of broadband for service delivery (51 percent compared to 39 percent for businesses and nonprofits). However, smaller entities have lower adoption levels. A number of municipal governments expressed concern over consequences of moving services online for households not using the Internet. In addition, lack of ubiquitous household access may prevent government entities from realizing the full cost benefits of online service delivery by being required to maintain traditional methods of service delivery in parallel. Another issue with policy implications was the impact of increased broadband availability on those communities still without broadband. The e-Solutions Benchmarking found strong evidence that not having broadband Internet in one's community will have severe negative impacts over time, with a loss of both businesses and economically active households.

Strategic Implications:

a) Municipalities and counties should develop strategies to ensure that households that do not use the Internet are not disadvantaged or isolated as services are moved online.
b) Where broadband is still not available, economic development agencies, municipalities and counties should take immediate steps to support or initiate development of broadband infrastructure in their communities.

Nonprofit: The e-Solutions Benchmarking found that the nonprofit sector had the least resources for broadband adoption. However, the e-Solutions Benchmarking also found that there was significant untapped potential for collaborative approaches to address the lack of resources. Another area with potential for improvement was online services to clients in their homes, especially by the human services sector. The potential for online services in human services is demonstrated by the success of telepsychiatry.

Strategic Implications:

a) The nonprofit sector should promote collaborative approaches that address the lack of financial and IT resources of many agencies in the sector.
b) Human service agencies should develop pilot projects that identify the potential and best practices for delivery of online services to clients in their homes.

5. Strategic Implications and Recommendations Going Forward

Based on the strategic implications presented in this *e-Strategy Report – North Carolina*, SNG submits the following recommendations for broadband planning:

- Continued leadership and effort by the e-North Carolina Authority to address the gaps identified in the e-Solutions Benchmarking, including continued engagement with stakeholders at the local, regional, state and federal levels to collaboratively find cost-effective solutions.
- Set priorities and targets for infrastructure coverage and capabilities, as well as adoption of e-solutions at a regional or local level in collaboration with local and regional stakeholders.
- Ongoing benchmarking on the utilization of broadband and e-solutions:
    i. To track whether targets have been achieved;
    ii. To review programs and support activities, and to adjust policies and programs as appropriate; and
    iii. To remain competitive as technology and business practices evolve.

The strategic implications from this report are summarized below for the convenience of the reader.

5.1 CONNECTIVITY

Unserved communities:

a) Continue to use mapping to identify unserved communities.
b) Promote new broadband infrastructure to serve these areas.
c) Promote higher-end infrastructure such as fiber or at least the most robust iterations of cable and DSL.
d) Strongly promote network design that incorporates redundancy and mobile web capabilities, such as G4 cell phones.

Unserved pockets within served communities:

d) Map and document unserved areas with served communities.
e) Explore avenues for encouraging existing providers to expand their infrastructure into these unserved areas.
f) Assess opportunities for small-scale local wireless solutions, including MESH approaches. Support local wireless solutions where deemed viable, either through technical or financial assistance.

Uncompetitive broadband:

e) Develop mechanisms that encourage incumbent providers to upgrade existing "low speed" or poor reliability infrastructure. These mechanisms should not be seen as "one-time" efforts, but rather part of an on-going process for upgrading infrastructure in a manner that is equitable across the State.
f) Identify high-utilization areas or clusters that may make a business case for private sector investment, but were missed because 'they are under the radar' of the carriers who have not conducted similar e-Solutions Benchmarking as e-NC.
g) Encourage fiber infrastructure wherever possible.
h) Develop redundancy within networks, especially in town centers. Where the business case does not provide a rationale for investing in community-wide redundancy, consider supporting the development of local backup centers that can be used for short-term service interruption (in case of power failure or interrupted IP supply).

Mobile broadband:

i) Extend mapping efforts to track infrastructure capable of supporting mobile Internet access.
j) Encourage mobile wireless Internet Service Providers and telecommunications companies to extend 3G and 4G capabilities to areas currently without such service.

5.2 BROADBAND ADOPTION

Building on the evidence provided by the e-Solutions Benchmarking and post-survey interviews, the following strategies should be considered in developing any initiative promoting the adoption of broadband and broadband-enabled applications and processes.

k) In designing broadband adoption initiatives, priority should be given to households that currently do not utilize the Internet, as well as small commercial and nonprofit organizations.
h) Initiatives targeting households that either do not use or rarely use the Internet should utilize existing community networks and anchor institutions.
i) Adoption initiatives targeting households should emphasize content that is attractive to the target group, rather than basic computer or Internet literacy.
j) Public service providers, especially health and human services, should be encouraged to develop content and services for use in personal residences.
k) Emphasis should be given to the development of online resources that assist small businesses and organizations and households to acquire knowledge and skills required to adopt advanced Internet applications and processes.
l) Broadband adoption initiatives for commercial and non-commercial organizations should emphasize peer-to-peer networks and cost-effective collaborative solutions.

m) Broadband adoption initiatives should consider utilizing existing stakeholders to access target groups.

5.3 SECTORS

Health sector

Strategic Implications:

n) The State and health networks should develop avenues to encourage and support smaller health providers in their adoption of EHR and telehealth services.

o) The State and health networks should actively explore ways of expanding use of telehealth services to patients in their homes.

Municipal / County Government

Strategic Implications:

p) Municipalities and counties should develop strategies to ensure that households that do not use the Internet are not disadvantaged or isolated as services are moved online.

q) Where broadband is still not available, economic development agencies, municipalities and counties should take immediate steps to support or initiate the development of broadband infrastructure in their communities.

Nonprofit

Strategic Implications:

r) The nonprofit sector should promote collaborative approaches that address the lack of financial and IT resources of many agencies in the sector.

s) Human service agencies should develop pilot projects that identify the potential and best practices for delivery of online services to clients in their homes.