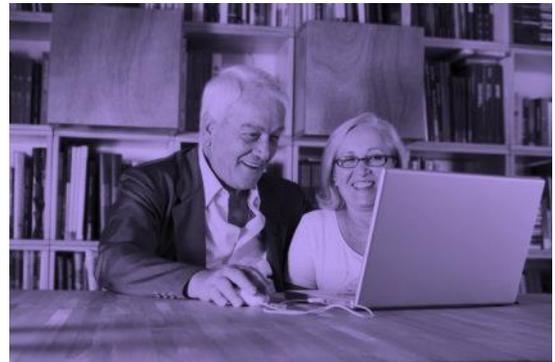


Community Technology Action Plan

Leelanau Peninsula, Michigan: April 2017

ABRIDGED VERSION



Prepared as part of the Connected Community Engagement Program



The following organizations contributed their time and expertise as part of the Leelanau Peninsula Broadband Team:

Leelanau Peninsula Economic Foundation (LPEF) Technology Committee

Leelanau Peninsula Economic Foundation

Networks Northwest

Leelanau Peninsula Chamber of Commerce

Leland Township Library

Leland Public Schools

Glen Lake Community Schools MSU Extension

Grand Traverse Band of Ottawa and Chippewa Indians

Leelanau Township Library

Glen Lake Community Library

Suttons Bay-Bingham District Library

Leelanau Township Community Foundation/Leadership Team

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EXECUTIVE SUMMARY

Today, technology plays a pivotal role in how businesses operate, how institutions provide services, and where consumers choose to live, work, and play. The success of a community has become dependent on how broadly and deeply the community adopts technology resources, which includes access to reliable, high-speed networks, digital literacy of residents, and the use of online resources locally for business, government, and leisure. As noted in the National Broadband Plan (NBP), broadband Internet is “a foundation for economic growth, job creation, global competitiveness and a better way of life.”

The purpose of this document is to summarize the results of a community technology assessment for Leelanau Peninsula and to provide the next steps for addressing any deficiencies or opportunities for improving the local technology ecosystem in order to advance economic, social, and educational opportunities for families, businesses, and institutions in the community.

This Community Technology Action plan was developed following a comprehensive community assessment performed by the Leelanau Peninsula Broadband Team as part of Connected Nation’s Connected Community Engagement Program. Using the Connected assessment toolkit, the community team was able to examine the access, adoption, and use of broadband and related technologies in the community.

One key output from this process is the Connected Community Scorecard, which is used to summarize the results of the community broadband assessment and relative standing of communities participating in this process. Through the work of the

Leelanau Peninsula Broadband Team and information reflected in this document, Leelanau Peninsula achieved a score of 68.43 points out of 100 for overall broadband and technology readiness.

While the results indicate that the community has made tremendous strides and investments in technology, priority projects were identified to help catapult the community to a new level of technology access, adoption, and use.

Some key priority projects include:

- Perform an Analysis of Local Policies and Ordinances
- Develop Public-Private Partnerships to Deploy Broadband Service
- Complete a Vertical Assets Inventory
- Identify, Map, and Validate Broadband Demand
- Launch a Digital Equity Initiative - Promote Low- Cost Broadband Service Offerings for Vulnerable Populations
- Increase Download Speeds in Libraries

This plan is a blueprint for leveraging technology to improve quality of life and advanced community and economic development. Below are the detailed results and recommended strategies for Leelanau Peninsula.

Project Background

The Leelanau Peninsula Economic Foundation (LPEF) Technology Committee partnered with Connect Michigan to survey Leelanau County residents and stakeholders to identify its broadband needs and priorities. The project will be helpful to efforts designed to identify areas lacking broadband access and for

developing mechanisms to promote expansion of services via attracting additional providers.

The Technology Committee’s Chair, Commissioner Patricia Soutas-Little, says, “Broadband is vital for so many businesses and residents. Leelanau County has such a diverse landscape, knowing current accessibility and residential needs, will help us plan for the future.”

High-speed Internet and broadband capabilities can no longer be considered a “luxury.” Indeed, Internet is considered a utility and a critical necessity for schools, families, libraries, business owners, and emergency services personnel.

Current Community Technology Developments

- AT&T and Century Link have accepted Connect America Funds (CAF) to expand broadband service in unserved areas.
- Charter Communication has added network enhancements and speed upgrades in its Maple City plant.
- Leelanau County has launched program with Peninsula Fiber Network that brings Next Generation 911 service to the residents and businesses of Leelanau County.

Project Focus Areas

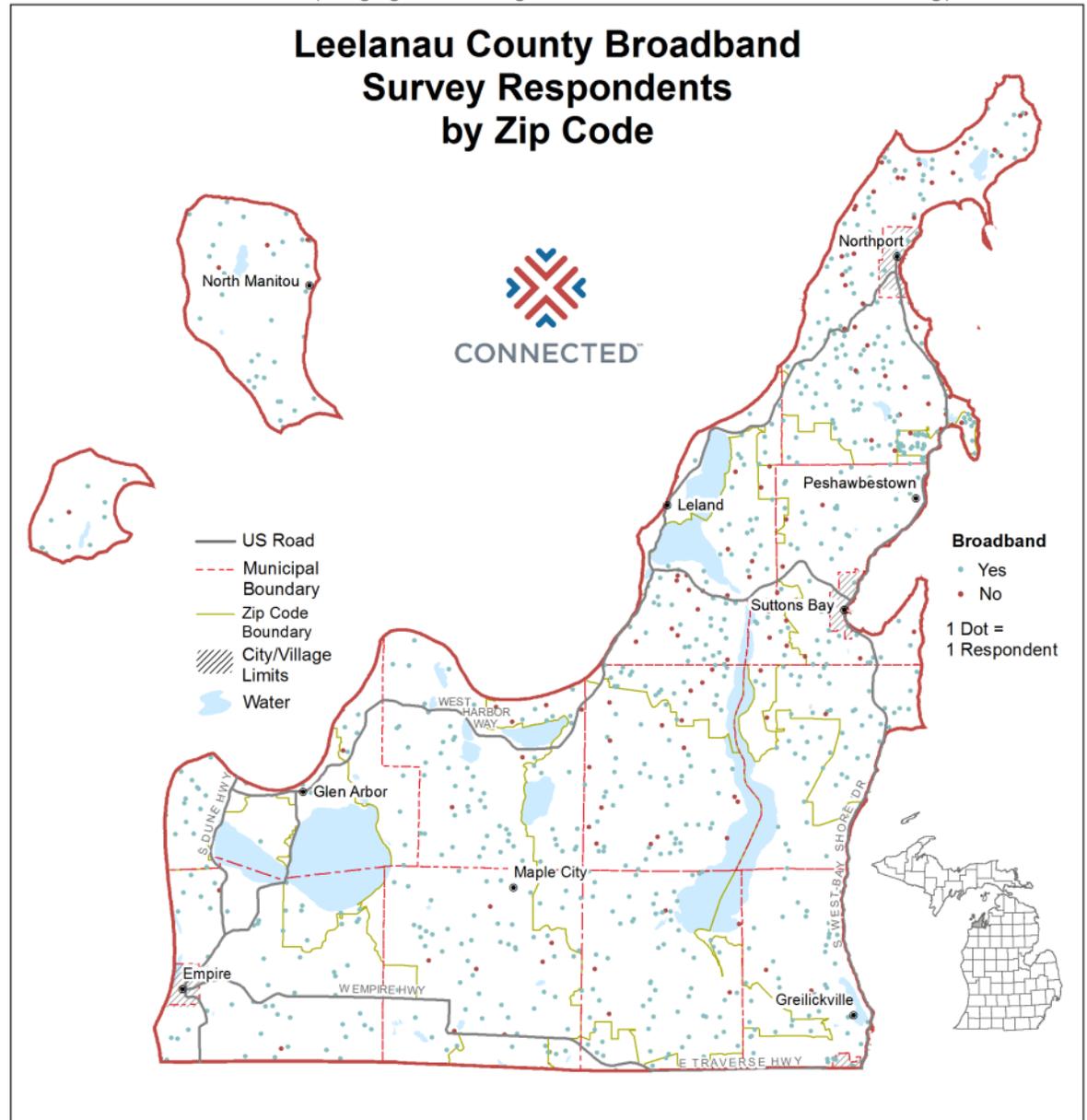
In addition to the Libraries/Community Organizations Use focus area, the Leelanau Peninsula Broadband Team chose to examine eight additional Use areas including:

Home Broadband Adoption

The adoption of home Internet service is the single most critical step for families to experience the benefits of being connected to the digital economy. Adoption represents the choice families make to be connected or not. There are several factors that influence broadband adoption. Sometimes these factors are internal and influenced by behavior patterns and knowledge (e.g., digital literacy skill, awareness of benefits, etc.); other times these factors are external and the adopter has little or no control over them (e.g., cost and infrastructure availability). Adoption often follows broadband availability, but not always. With more and more services being conducted in an online environment and an increased desire to digitally communicate; those without a home broadband connection most often seek connections elsewhere breaking the *access-first-adoption-second* pattern.

Home Broadband Adoption looks at the percent of the community's population that subscribes to (adopts) Internet service. In 2014 the Leelanau Peninsula had 9,136 households. According to the Residential Technology Survey, 76.8% of households in the community subscribed to Internet service with a broadband connection at home. While this statistic provides a macro-level look at adoption in the community, additional survey questions allow for a deeper analysis of adoption in order to find the demographic or socioeconomic groups struggling with digital inclusion.

For comparison, the United States American Community Survey estimates that 75.1% of households across the country have an Internet connection. Across Michigan, this figure is slightly higher at 78.9% of households. Adoption in the Leelanau Peninsula is higher than the national average, but less than the

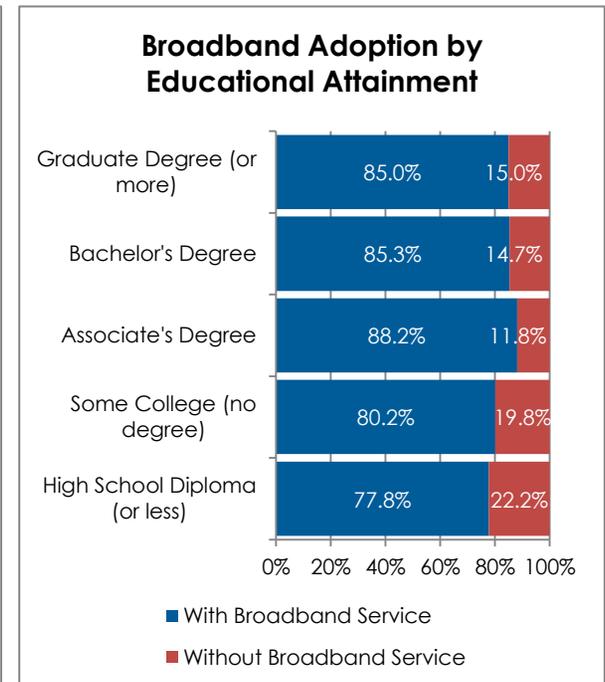
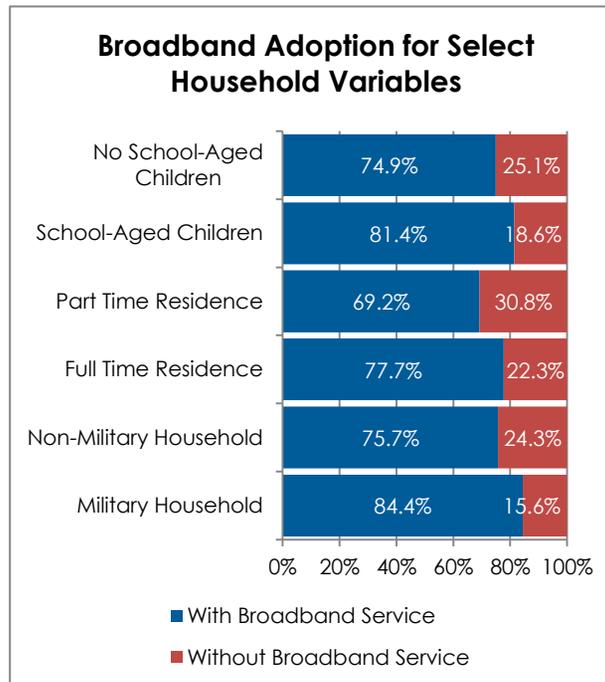
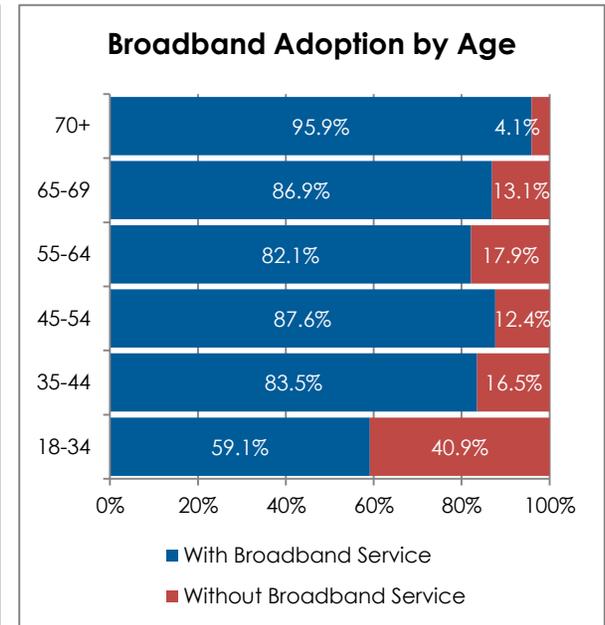
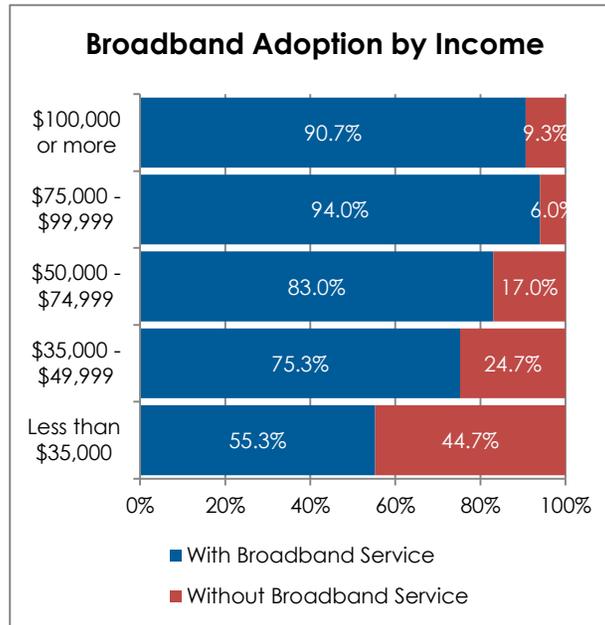


state average. This is likely due to a number of issues (including a lack of infrastructure access) that will be analyzed in the following pages.

Home Broadband Adoption – Digital Divide

The charts at right provide insight into Home Broadband Adoption for various demographic groups in the community. From this data, the following observations can be made regarding those on the wrong side of the digital divide in the Leelanau Peninsula:

- Households earning less than \$35,000 annually are significantly less likely to adopt an internet connection at home compared to households earning more. This is consistent with national and state trends.
- Somewhat inconsistent with state and national averages, adults aged 18-34 in the Leelanau Peninsula are less likely to adopt broadband than their older neighbors.
- While adults with a high school diploma or less have a slightly lower adoption rate than other levels of educational attainment, there is no significant relationship between educational attainment and broadband adoption.
- Households with school-aged children are more likely to have a broadband connection than those without students in the K-12 system. Broadband is often a necessity for students to complete lectures and assignments.
- Full time residents have a higher rate of broadband adoption, likely due to their year-round presence in the community.
- Non-military households have a lower rate of broadband adoption than households with active or retired veterans.



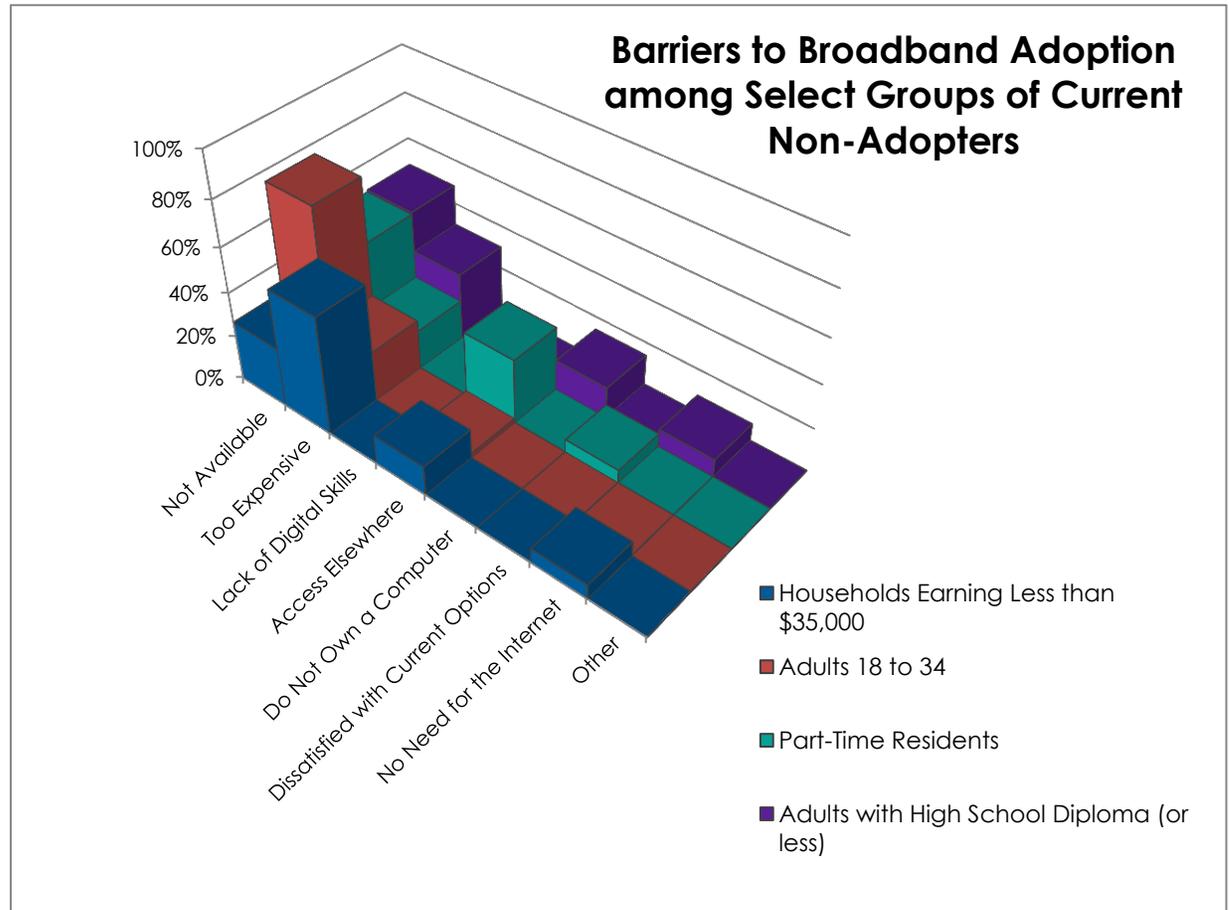
Home Broadband Adoption – Barriers

Once the broadband adoption rates for various socioeconomic and demographic groups have been identified, the next important step is to examine the barriers to broadband adoption among them. This analysis examines five groups of current non-adopters and the barriers they face; 1) households earning less than \$35,000 annually; 2) adults aged 18 to 34; 3) part time residences; and 4) adults with a high school diploma or less. The chart at right shows the percent of households in each group that indicated their primary barrier to having a home Internet connection.

Across the Leelanau Peninsula, the primary barrier preventing home broadband adoption is a lack of infrastructure. Among all households without a home internet connection, 54.8% cite a lack of availability as the primary barrier. This is also reflected in three of the four groups featured in the chart on the right. Adults 18 to 34, part-time residents, and adults with a high school diploma or less cite a lack of availability as the primary barrier to adoption. This indicates that if infrastructure were available, these groups would be likely to adopt. This barrier is also cited by households earning less than \$35,000, annually, but it is not their primary barrier.

The cost of a home internet connection is the second most oft cited barrier to adoption. Among all non-adopting residents, 24.4% say that a home internet connection is too expensive. This sentiment is reflected among the four groups in the chart as well. The cost of service is the primary barrier for households earning less than \$35,000, annually, and is the second most common barrier for adults aged 18 to 34 and those with a high school diploma or less.

Part time residents are more likely than other groups to cite that they access the internet some place other than home. This is likely due



to their temporary presence in community. If a connection is not available at their home or if it is cost prohibitive they will likely find internet connectivity elsewhere and not be as concerned with finding a home connection that meets their needs.

Adults with a high school diploma or less are the only group to cite a lack of computer as a barrier to adoption.

Finally, 6.7% of households earning less than \$35,000 and 8% of adults with a high school diploma or less are the only groups in the chart

to indicate there is no need for the internet at their home as a barrier to adoption.

Affordability

The Affordability metric examines one of the primary barriers to broadband and technology adoption. The cost of having an Internet connection can stem from several sources including the monthly cost of service, installation and equipment costs in order to obtain service, and the cost of an Internet-enabled device (e.g., computer, tablet, smart phone, etc.). These costs can be a burden for families with lower incomes and thus the choice to connect is controlled by the external cost of service for these households. This disconnection can leave families on the wrong side of the digital divide.

The affordability metric compares the average cost of residential Internet service in the community to the average cost in the state and nation as a whole. In 2015, the national average monthly subscription cost for Internet service was \$71.71. In the Leelanau Peninsula, this cost was \$53.52, approximately 74% of the national average. Subscription price information was gathered from eight residential providers that offer a total of 21 subscription packages and the national average is from data gathered by the FCC.

While this comparison offers high-level insight into broadband affordability, results from the Residential Technology Survey provide greater insights into solving local digital inclusion issues.

As shown, the cost of broadband service across the Leelanau Peninsula is less than the national average overall and across most of the individual speed tiers. Costs in the community are less than or comparable to the average for Michigan as a whole.

While the costs of Internet service are generally less than the national average, cost is still a significant barrier to the adoption of technology by many in the community. Of the current non-adopting households in the

Average Monthly Cost of Service by Download Speed Tier



community, 24.4% cite the price of service as the primary barrier to subscribing at home.

Additionally, households with Internet service were asked if they were satisfied with their current connection. Of those with a home broadband connection, 63.8% stated their current Internet service does not meet their needs. The table provides the reasons for dissatisfaction among these respondents (respondents could choose multiple reasons):

As shown, 58.2% of current subscribers say that the cost of their service is too high.

The complaint of slow speed could be attributed to the fact that 16.2% of households in the community do not have access to broadband at the current FCC defined speed

(25 Mbps down and 3 Mbps up). Nearly three-quarters (70%) of households in the community who know their connection speed at home connect at less than 25 Mbps download.

| Reason | Respondents |
|--------------------------|-------------|
| Speed is too slow | 83.6% |
| Connection is unreliable | 61.0% |
| Price is too high | 58.2% |
| Customer service is poor | 22.3% |
| Connection data limits | 5.9% |
| Other | 4.0% |

Digital Literacy

Digital literacy is the “ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.” This definition of digital literacy from the American Library Association succinctly describes the goals of measuring and improving the digital literacy in a community. Technology skills are critical for competing in the global, digital economy.

The digital literacy metric examines three areas of technology skills; those associated with hardware, software, and online activity and communications.

Respondents to the Residential Technology Survey were asked to self-assess their own technology skills among several devices, applications, and activities within each of the three digital literacy areas on the following scale

0 = No Experience (“I need to learn.”)

1 = Basic Skill (“I know a little about this technology.”)

2 = Intermediate Skill (“I’m very comfortable using this technology.”)

3 = Advanced Skill (“I could teach this technology to someone else.”)

N/I = Not Interested (“I’m not interested in this technology.”)

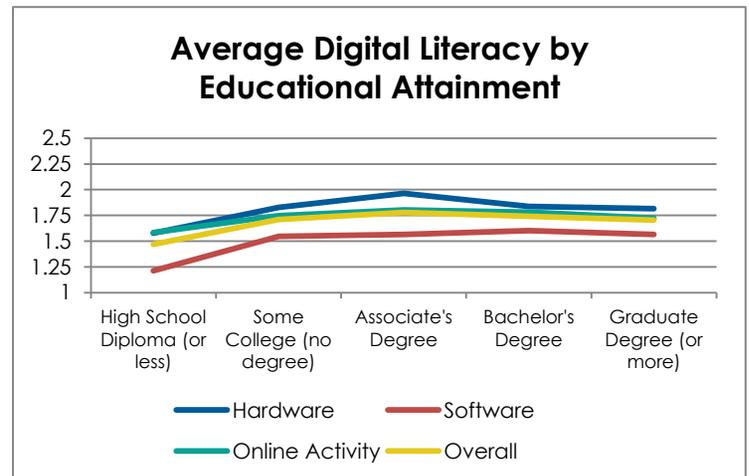
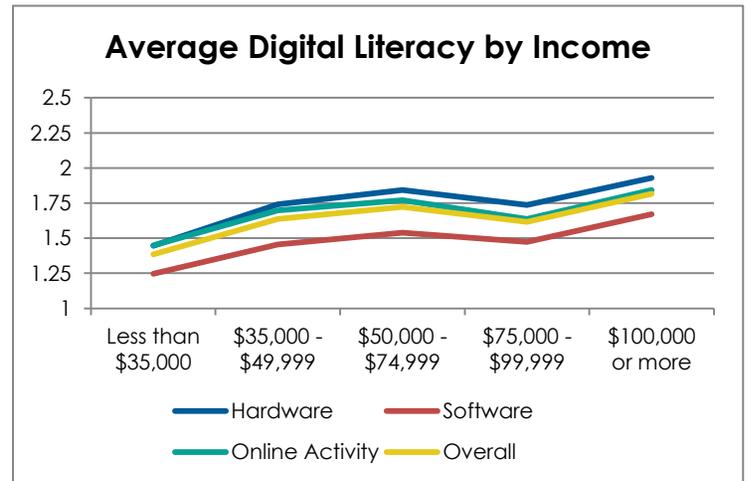
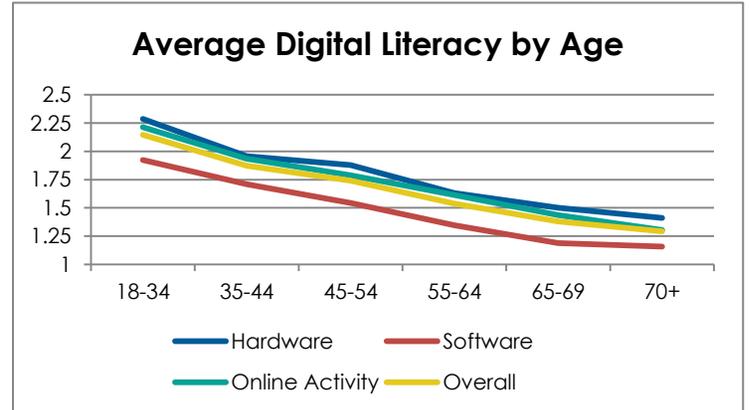
Among all residents in the community, the average score for Hardware Digital Literacy was 1.76, the average score for Software was 1.46 and for Online Activity, 1.70.

These charts explore average overall digital literacy skill, as well as skills across the various hardware, software, and online activity digital literacy scores across several demographic groupings.

According to the self-assessed results from survey respondents, average digital literacy tends to decline with age, increase with income, and increase but plateaus with higher levels of educational attainment.

Below are a few notes of interest regarding digital literacy in the community:

- More than 55% of residents stated that they “know a little about” or “need to learn” about staying safe online. Knowledge of cybersecurity drops significantly with age.
- Overall, residents are quite comfortable with the three basic types of computers (i.e. desktop, laptop, and tablet), with an average skill rating of 2.2 across all three devices.
- Knowledge of both smart mobile phones and analog mobile phones tends to decline with age.
- Residents are significantly more comfortable with Facebook than they are with Twitter or other social media platforms, (avg. rating of 2.1, 0.83, and 1.72, respectively).
- Even though a large portion of residents are not proficient with cybersecurity, they are proficient with conducting online banking and bill payment; an activity typically fraught with opportunities for identity exposure or fraud. Nearly nine-tenths (88.2%)of residents say they are comfortable with e-banking or could teach it to others.



Public Computers

The expense associated with home computer ownership represents a significant barrier to broadband adoption. For low-income residents without the ability to purchase a home computer (or other device), a public computer center may be their only opportunity to access the Internet. Further, public access to technology is necessary for community members who have little or no communication technology available in the home, need assistance to effectively use of technology, or to supplement connectivity at home or in schools.

A community should have sufficient, free access to computers, Internet, wireless networks, and other communication technologies to support the needs of residents. In addition, public computer centers should be located in safe facilities, with adequate levels of privacy, security, and accessibility for people with disabilities. Information regarding the availability and location of public computer centers should be widely disseminated.

The Public Computers metric examines the ratio of public computers in the community per 1,000 people in the community. Data gathered from the Libraries and Community Organizations Survey distributed throughout the community identified 28 public computers for use within the community across four locations. In 2015, the population in the Leelanau Peninsula was 21,981. The ratio of public computers per 1,000 people in the community is 1.27.

The table provides a list of locations and the number of Internet-enabled public computers available for use. Additionally, all four library locations in the community offer free Wi-Fi to the public. Libraries also were asked to indicate the three groups that comprise the majority of public computer users. Adults aged

| Public Computer Locations | |
|--------------------------------------|------------------|
| Location | Public Computers |
| Glen Lake Community Library | 5 |
| Leland Township Library | 10 |
| Leelanau Township Library | 6 |
| Suttons Bay Bingham District Library | 7 |
| Total | 28 |

55 and over with the most frequently cited group of public computer users. Low-income patrons were also cited frequently. Other identified groups were students, adults aged 19-54, job-seekers, and those without a home internet connection. These groups are not mutually exclusive and may overlap.

Additionally, the Residential Technology Survey asks residents who don't have a home Internet subscription the location where they do access the Internet. The following table shows the locations from which non-adopting residents access the internet.

More than two-fifths (43.3%) of non-adopting residents access the internet from a public computer at a library. Places of employment are equally popular places to access the web. Coffee shops or restaurants are popular for accessing the internet for 20.9% of current non-adopters. While libraries and places of employment often supply an internet-connected device, accessing the web at a coffee shop or restaurant requires the user to have their own device.

| Locations Non-Adopters Access the Internet | |
|--------------------------------------------------|------------------------|
| Location | Non-Adopting Residents |
| Place of Employment | 43.3% |
| Library | 43.3% |
| Coffee Shop or Restaurant | 20.9% |
| Friend or Family Member's Home | 6.7% |
| School | 4.5% |
| Other | 3.0% |
| Do Not Access the Internet | 0.7% |
| Religious Facility | 0.7% |
| *Respondents could choose more than one location | |

Frequency of Internet Use

The Internet has moved from an occasional tool to one of the principal ways we communicate, perform research, work, or participate in leisure activities. Measuring the frequency of Internet use among community residents allows a glimpse into the importance of the Internet in their lives. More importantly, this analysis can identify the common traits among those who use the Internet less frequently and develop solutions for including them in the digital ecosystem.

The Frequency of Internet Use metric is calculated by finding the average frequency with which survey respondents state they access the Internet. For Leelanau Peninsula the majority of residents access the Internet either constantly throughout the day or at least several times each day.

While it appears that the community as a whole uses the Internet on a daily basis, further examination of certain groups within the community reveals disparities.

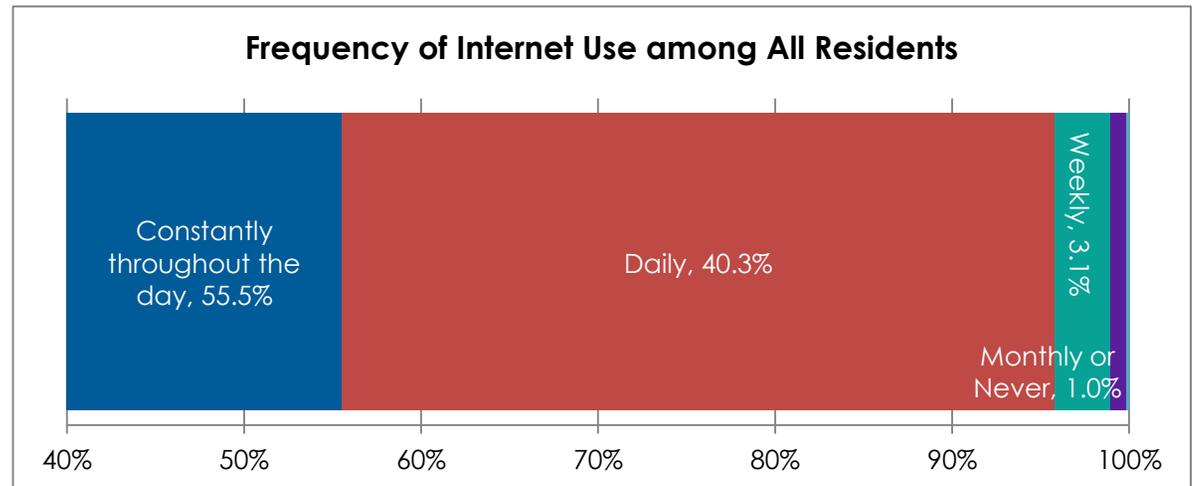
There is significant difference in the frequency with which residents with and without a home broadband connection access the internet. Those without a home internet connection that state they access the internet "constantly" likely do so from a mobile device.

Frequency of internet access tends to decrease with household income. Among households with incomes less than \$35,000, 3.7% state the only access the internet weekly. Similarly, frequency of internet access tends to slow as age increases. For example, among adults aged 55 to 64, 3.7% state they access the internet weekly and 2.1% say they do so monthly.

While frequency of Internet use is a personal choice, for those completely without or with restricted access to the network, those who

cannot afford a connection, those without the skills to use the Internet, and those with limited awareness of the opportunities afforded by the Internet, their opportunity to make such a personal choice is severely limited.

| Frequency of Internet Use by Select Groups | | | | | |
|--------------------------------------------|------------|-------|--------|-----------------|-------|
| Group | Constantly | Daily | Weekly | Monthly or Less | Never |
| Home Internet Connection | | | | | |
| With Home Connection | 60.0% | 37.4% | 1.4% | 1.1% | 0.0% |
| Without Home Connection | 33.8% | 53.7% | 11.8% | 0.0% | 0.7% |
| Age | | | | | |
| 18-34 | 57.3% | 36.6% | 6.1% | 0.0% | 0.0% |
| 35-44 | 69.4% | 29.4% | 0.0% | 0.0% | 1.2% |
| 45-54 | 58.0% | 40.2% | 1.8% | 0.0% | 0.0% |
| 55-64 | 52.1% | 42.1% | 3.7% | 2.1% | 0.0% |
| 65 or Older | 51.2% | 44.6% | 2.9% | 0.0% | 0.0% |
| Household Income | | | | | |
| Less than \$35K | 45.0% | 51.3% | 3.7% | 0.0% | 0.0% |
| \$35K to Less than \$50K | 58.8% | 39.2% | 2.0% | 0.0% | 0.0% |
| \$50K to Less than \$75K | 52.1% | 45.1% | 2.1% | 0.7% | 0.0% |
| \$75K to Less than \$100k | 48.5% | 48.5% | 1.5% | 1.5% | 0.0% |
| Greater than \$100k | 66.9% | 32.3% | 0.5% | 0.0% | 0.2% |



Use

The access and adoption of broadband and Internet technologies leads to the Use of that connection and applications to improve the quality of life of a community. Technology impacts every sector of our economy and opportunities abound for residents, businesses, and institutions to leverage technology to make improvements in their day-to-day lives and operations.

The wellbeing of a community involves the complex interaction of several sectors including healthcare, K-12 and higher education, public safety, government, libraries, residents, private-sector businesses, and others. These distinct, yet entwined, sectors (and their many individual parts and entities) contribute to that community's place in the digital economy. As broadband and related technology have developed over time, applications pertinent to each of these sectors have been developed that allow them to function, provide services, generate revenue, and generally operate more efficiently, which impacts their contribution to the community. The use of broadband and technology is critical to the impact these sectors have on the overall wellbeing of a community.

Recognizing the importance of technology for every part of a community, the Connected assessment examines the Use of broadband among these many sectors. Recognizing that every community is different and may want to focus on areas that are more pertinent than others, community's choose at least four Use sections for analysis, (in addition to the Libraries/Community Organizations focus area, which is required). Additionally, the Leelanau Peninsula Broadband Team has chosen to examine the Agriculture, Economic Prosperity, Government, Healthcare, K-12 Education, Public Safety, Talent/Workforce, and Tourism sections.

Use Highlights

| | |
|-------|----------------------------------------------------------------|
| 43.3% | Adults without home Internet accessing the web at libraries |
| 1.39 | Internet-enabled devices per student across the community |
| 81% | Businesses with a website |
| 65.1% | Employers who feel tech. training is important for business |
| 39.4% | Residents who telework with some frequency |
| 56.3% | Agriculture operations with internet service less than 10 Mbps |

Use/Libraries and Community Organizations

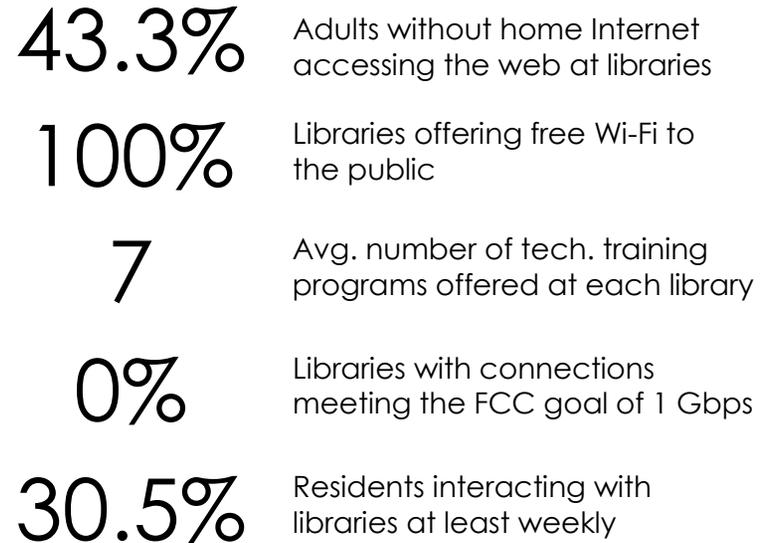
Libraries and other community organizations serve a vital role in providing access to information and technology for the entire community. Libraries often host public computers with Internet access for those without a device or connection at home, and also provide various types of technology training to develop a more digitally literate community.

The Libraries and Community Organizations Use section comprises six different metrics. Data for these metrics is derived from the Libraries and Community Organizations Survey that was distributed to entities throughout the community, as well as from the Residential Technology Survey. In the Leelanau Peninsula, survey responses were received from four libraries in the community. Four community organizations also responded.

The following libraries and community organizations submitted a response to the survey: Glen Lake Community Library, Leland Township Library, Leelanau Township Library, Suttons Bay Bingham District Library, ShareCare of Leelanau, Inc., Saving Birds Thru Habitat, Northport Arts Association, and the First Evangelical Lutheran Church.

The Libraries and Community Organizations Use metrics include broadband adoption, website use, training, advanced technology use, frequency of digital communication, and community awareness.

Use/Libraries & Community Organizations Highlights



Broadband Adoption

The Broadband Adoption metric measures the number of libraries with Internet service. Each of the four libraries in the community have an internet connection between 50 Mbps and 100 Mbps. All four of the community organizations also have an internet connection, and their connection speeds vary. Additionally, all libraries offer free Wi-Fi connections to the public in addition to public computer access (see Public Computers section of this plan).

While every library in the community has an internet connection, no library in the community currently meets the goal of 1 gigabit per second broadband established by the Federal Communications Commission in the National Broadband Plan.

Website Use

The Website Use metric measures the number of libraries with a website. All eight of the responding libraries and organizations have a website. Additionally, all eight organizations implement advance website features, with an average of 7 of 11 features used across all respondents. Libraries tend to employ more advanced features than community organizations, with an average of 8 features used among libraries, and five among community organizations. Advanced features include: Calendar of events, staff-accessible content management system, contact information accessible from homepage, integration with social media accounts, integrated search function, links to relevant and related organizations, login for clients/patrons/staff, newsfeed for current updates, organization leadership and contact information, stated privacy policy, online feedback mechanism, and the ability to conduct transactions online, (e.g., bill payment, registration, etc.).

Training

Libraries provide opportunities for digital literacy training outside of a traditional classroom setting within a facility dedicated to accessing information. The average number of training programs per location is 7.

All four libraries offer basic computer, cyber-safety, and device orientation training. The Leland Twp. and Suttons Bay libraries offer a more diverse array of digital training than the others. Only the Suttons Bay library offers training with office productivity software (e.g. Microsoft Word, Excel, etc.). Additionally, no library offers coding or program/app development training.

An examination of the self-reported digital literacy skills of specific applications and devices provides guidance for expanding technology training programs in the community. The applications and devices included in the analysis of digital literacy can be translated into the types of training programs offered at community libraries. The chart provides a glimpse into the skill needs of the community's residents.

The chart shows the percent of residents responding to the survey that indicated they

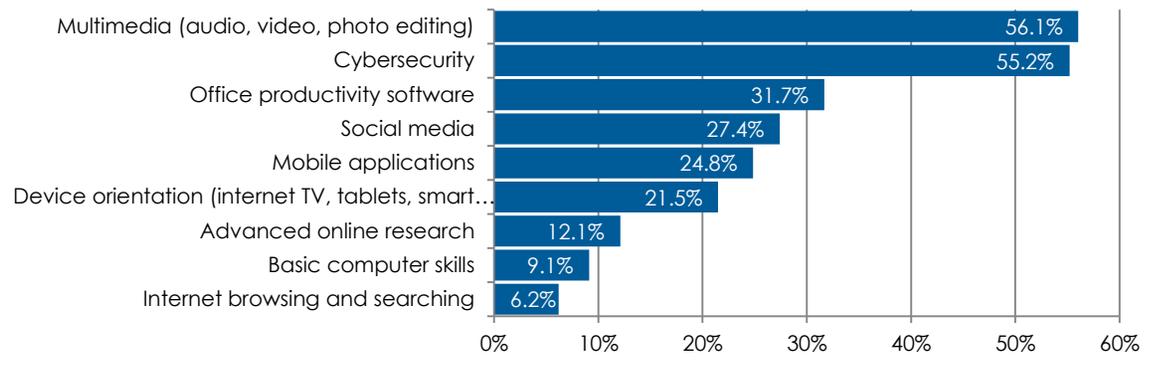
| Library Locations and Training Opportunities Offered | | | | |
|------------------------------------------------------|-----------------------------|---------------------|-----------------------|-----------------------------------|
| Training Opportunities | Glen Lake Community Library | Leland Twp. Library | Leelanau Twp. Library | Suttons Bay Bingham Dist. Library |
| Basic computer skills | X | X | X | X |
| Coding & program/app. development | | | | |
| Cyber-safety | X | X | X | X |
| Device orientation | X | X | X | X |
| Internet browsing and searching | X | X | | X |
| Advanced online research | | | | |
| Mobile device applications | | X | | X |
| Multimedia | | X | X | X |
| Office productivity software | | | | X |
| Social media | | X | X | X |
| Technology for businesses | | X | | X |
| Website development | | X | X | |

“need to learn” or “know little about” the selected technologies. As shown, respondents were least familiar with multimedia applications (56.1%) and cybersecurity (55.2%), while most were comfortable with basic computer skills (9.1%) and browsing the Internet (6.2%). Nearly one-third (31.7%) of residents indicated that they need to learn or only know a little about office productivity software, applications that are often critical to on-the-job success in most occupations. These skill gaps can be aligned with the training currently offered within the libraries, and promotion and development can make these trainings more effective.

Advanced Use

The Advanced Use metric examines the implementation, or planned implementation, of several more advanced uses of technology

Percent of Residents Indicating They "Need to Learn" or "Know Little About" Various Technology Applications and Devices



digitally interact with the world or even those in one's own community. The Frequency of Digital Communication metric examines how often libraries and community organizations are leveraging digital tools and social media to inform, interact with, serve, and receive feedback from patrons/clients and the community. Survey results indicate that on average, libraries and community organizations in the Leelanau Peninsula are using digital tools to communicate an average of less than once per month.

The chart shows the average frequency of use for each of the digital communications tools included in the survey. Electronic newsletters, email, Facebook, and website updates are the most frequently used forms of digital communication. Text messaging is used frequently by some community organizations, but not by libraries. Video-based social media (Google Hangout, Meerkat, and Periscope) are never used, and Youtube is used by only one organization. Social media, in general, is used quite infrequently.

within the community's libraries or organizations. The table describes each of these advanced uses along with the number of libraries/organizations that currently use each technology, the number that plan to implement the technology, and those not interested in the technology. As shown in the table, there is a mix of current implementation, those planning to do so, and those not interested in the various technologies. Community libraries tend to have more of

these technologies already implemented or are planning to implement them than the other responding organizations. One organization, Saving Birds Thru Habitat, plans to implement a live web video feed of nesting Phoebe's, a use not included in the original question.

Frequency of Digital Communication

Technology coupled with an Internet connection provides a myriad of ways to

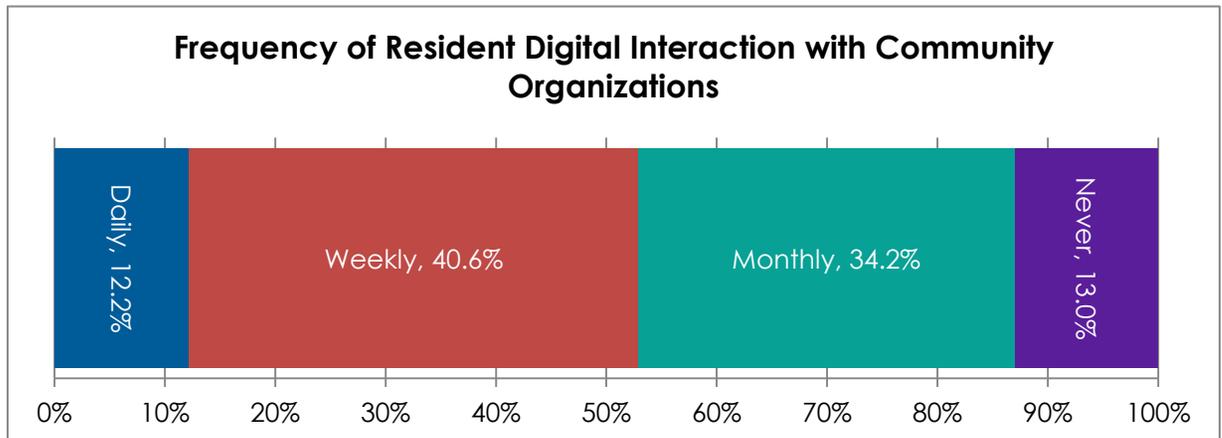
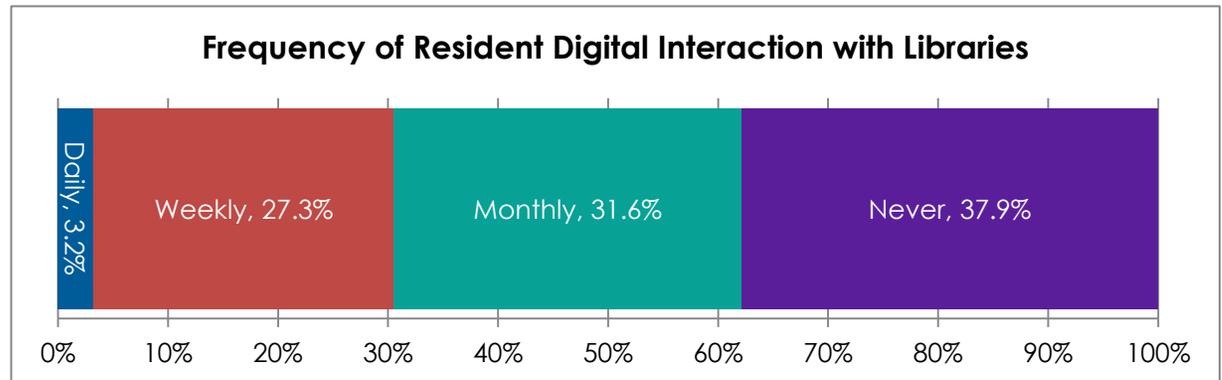
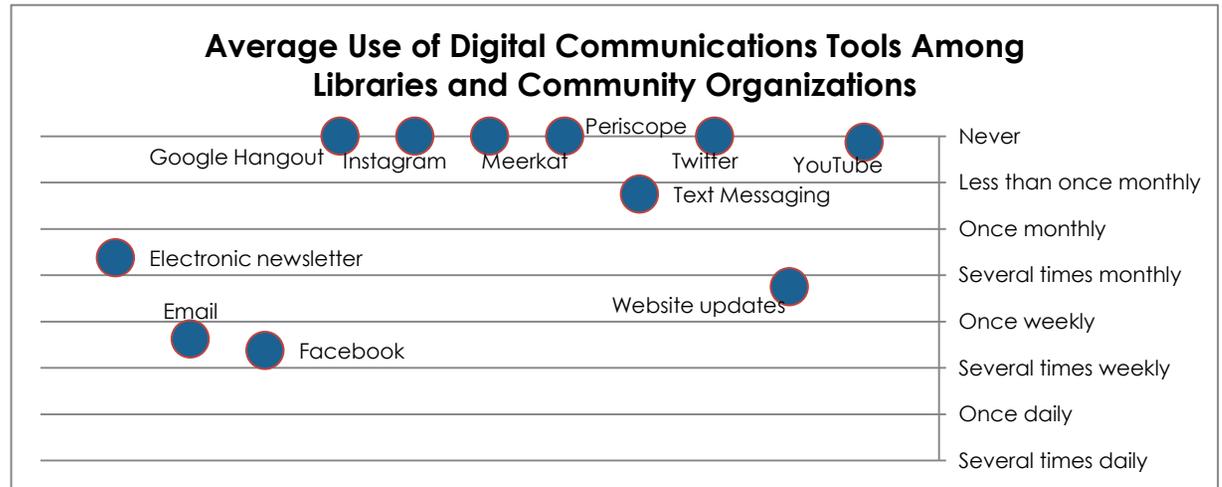
Locations Using, Planning to Implement, or Not Interested in Advanced Applications

| Advanced Use/Application | Currently in Use | Planning to Implement | Not Interested |
|--------------------------------------------------------|------------------|-----------------------|----------------|
| Patrons/clients can access critical information online | 6 | 0 | 2 |
| All staff have e-mail accounts | 7 | 1 | 0 |
| Organization offers meeting facilities with technology | 2 | 3 | 3 |
| Digitizes local community information | 0 | 6 | 2 |
| Utilizes electronic system to manage resources | 4 | 3 | 1 |
| Organization maintains local listserv or e-mail list | 2 | 2 | 4 |
| Websites and/or web portals are mobile compatible | 11 | 0 | 0 |
| Uses adaptive technology for patrons/clients | 3 | 3 | 2 |
| Voice-over Internet Protocol (VoIP) phone service | 2 | 2 | 4 |

Community Awareness

The Community Awareness metric measures the frequency with which residents state they digitally interact with libraries and community organizations. This metric can be thought of as the inverse of the analysis of digital communication tools used by libraries and organizations. Respondents of the Residential Technology Survey were asked to indicate the regularity with which they access online information from or interact electronically with libraries. Survey results indicate that residents interact electronically with libraries slightly more often than once per month. The table below provides a distribution of the various responses among survey respondents. While most residents (62.1%) say they interact with libraries with some frequency, 37.9% of residents indicate they never electronically interact with libraries. Those aged 18-34 tend to digitally interact with libraries more frequently than other age groups with 37.4% stating they do so at least weekly. Those with graduate degrees and students are also more likely to electronically interact with libraries at least weekly. Households with annual incomes between \$35,000 and \$50,000 also indicate more frequent interaction with libraries, as do households with K-12 aged children.

Additionally, residents were asked to indicate the frequency with which they digitally interact with community organizations. Residents interact with various community organizations far more frequently than they interact with libraries, (52.9% doing so weekly compared to 30.5% for libraries).



Use/K-12 Education

K-12 Institutions are the cornerstone of a community's educational system. K-12 education provides students with the knowledge and opportunity to become productive members of the next generation workforce. Schools, along with libraries, have traditionally been early adopters of new technologies, not only as the subject of education but also as tools. For this analysis, the Connected assessment is focused on the way in which Internet-enabled devices and applications are tools for enhancing the learning environment and providing students with opportunities beyond the classroom. Additionally, the assessment examines the use of technology that allows schools to more effectively communicate with parents, students, and the community at large.

The K-12 Education Use section comprises seven different metrics. Data for these metrics is derived from the K-12 Education Survey that was distributed to institutions throughout the community, as well as from the Residential Technology Survey. Six public and private schools and districts responded to the K-12 Education survey: Glen Lake Community Schools, Leland Public School District, Northport Public Schools, The Pathfinder School, St. Mary School, and Suttons Bay Public Schools.

The K-12 Education Use metrics include: electronic content delivery, advanced website use, frequency of digital communication, community awareness, student/parent engagement, one-to-one device implementation, and device to student ratio.

Use/K-12 Education Highlights

| | |
|--------------------|------------------------------------------------------------------------------------------|
| 76.6% | K-12 curriculum delivered with web-enabled technology |
| 18.6% | Households w/children without a home Internet connection |
| 18.2% | Households w/kids, but without Internet, that never digitally interact with K-12 schools |
| 50% | Surveyed schools with Internet speeds of 1 Gbps or more |
| 1.39 | Internet-enabled devices per student across the community |
| 2/3 ^{rds} | K-12 schools with both a parent and student online portal |

K-12 Overview

Apart from the analysis of the specific K-12 Education Use metrics (which focus on the use of technology by the schools themselves), the Connected assessment gathers information from the Residential Technology Survey that is pertinent to the discussion of technology for students. Below are several charts that examine the access, adoption, and use of home Internet connections for households with K-12 aged children. If schools are working to place an Internet-enabled device into the hands of every student, an Internet connection at home is critical to fulfill its intended purpose, which is to leverage technology beyond the classroom for expanded educational opportunities.

The Leelanau Peninsula is served by four public school districts and two private school systems. All six K-12 school systems responded to the K-12 Education survey.

According to survey results, the four public school districts are served by a fiber-optic broadband connection from the Traverse Bay Area Intermediate School District (in cooperation with Charter Communications). Suttons Bay, Northport, and Glen Lake Schools report a connection of 1 Gbps and the Leland Schools have a connection between 100 Mbps and 500 Mbps. The two private school systems have cable internet connections from Charter with speeds of 100 Mbps to 500 Mbps for The Pathfinder School and 25 Mbps to 50 Mbps for St. Mary School. Additionally, all public and private schools indicate that Wi-Fi connectivity is available in 100% of classrooms.

An analysis of K-12 technology adoption and use is not complete, however, without a discussion of the technology and connectivity available to K-12 students at home. The need for technology and an Internet connection at home increases as the use of technology increases in the classroom. Technology in education is often lauded as a great

equalizer, allowing all students, regardless of socioeconomic status, to have equal access to resources and content. However, if a child lacks internet connectivity at home, the divide between the technological haves and have nots is not reduced, but rather bolstered. In the Leelanau community, 18.6% of households with school-aged children do not have a home internet connection.

Electronic Content Delivery

Technology enables new forms of educational content delivery. Between traditional classroom instruction and online-only classes lies a spectrum of web and technology-enabled methods of learning. The K-12 Education Survey gathered data from schools on the mixture of various intensities of technology-enabled instructional environments. Electronic Content Delivery measures the mixture of technology-facilitated instruction and content.

Across the Leelanau Peninsula, the majority of schools in the community use web-facilitated and blended curriculum delivery.

The use of various technologies in course delivery varies between districts as well. For example, 70% of courses in Leland and Suttons Bay Public Schools use technology in a blended fashion, while St. Mary School and Glen Lake Schools tend to lean towards traditional and web-facilitated curriculum delivery. Each of the four public school districts indicate that at least 10% of their course delivery is conducted entirely online, with

Suttons Bay indicating that 20% is done online.

Web-enabled K-12 course delivery offers new opportunities for learning as well as access to educational content outside of the classroom. However, this method of delivery also relies heavily on students' ability to connect to the internet outside of school.

Advanced Website Use

A website is one of the most basic ways in which an institution establishes an online presence. Having robust, interactive, and communicative features on that website makes the user experience more efficient and impactful. The Advanced Website Use metric measures the average number of more advanced website features implemented across the websites of schools in the community. Twelve advanced website features were assessed.

For schools in the Leelanau Peninsula, the average number of advanced website features in use among all school websites is 9 out of eleven assessed features. The table provides the four most commonly used and the four least commonly used advanced features across all K-12 schools. The four public schools have implemented an average of ten advanced website features while the two private schools have implemented an average of seven.

Frequency of Digital Communication

Technology coupled with an Internet connection provides a myriad of ways to digitally interact with the world or even those

| Average Percent of Courses Delivered by Technology Type Across all School Districts | |
|-------------------------------------------------------------------------------------|---------------|
| Course Type | All Districts |
| Traditional – No online technology used | 23.3% |
| Web-facilitated – uses web-based tech to facilitate a face-to-face course | 40.0% |
| Blended – online and face-to-face delivery but with few physical meetings | 28.3% |
| Online – all content delivered online, no face-to-face meetings | 8.3% |

in one's own community. The Frequency of Digital Communication metric examines how often K-12 institutions are leveraging digital tools and social media to inform, interact with, serve, and receive feedback from parents, students, and the community.

Survey responses indicated that K-12 Schools use digital tools to communicate with the public at least several times per month.

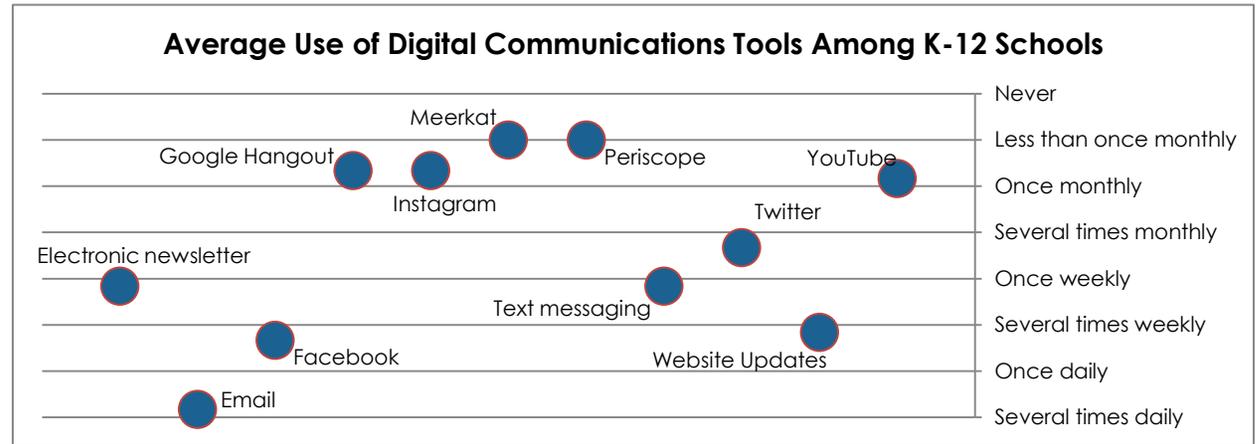
The chart shows the average frequency of use for each of the digital communications tools included in the survey.

As shown, some tools are used more frequently than others. E-mail, Facebook, and website updates are the most popular tools for communicating with parents and the public, while video-based platforms such as Google Hangouts, Meerkat, and Periscope are used less frequently. Twitter, Text Messaging, and Electronic Newsletters are also popular forms of digital communication. Frequency of use of social media (Facebook, Instagram, and Twitter) varies greatly by district. The Pathfinder School and Northport Public Schools are the most avid users of these social media platforms, using them at least several times per week, if not daily, to communicate with the public, while the other districts use them far less frequently.

Student/Parent Engagement

One way to digitally engage parents and students is through an online portal where participants can access individualized information regarding school performance, homework, activities, financial accounts, and much more.

The Student/Parent Engagement metric measures the presence of online student and/or parent portals across school districts in the community. Districts responding to the K-12 Education Technology Survey responded to the following two questions, 1) "Does the



school have an online portal for students to access homework, educational content, and other information?" and 2) "Does the school have an online portal for parents to access grades, pay bills, register for activities, etc.?"

Northport, St. Mary, Leland, and Glen Lake Schools indicate that they have an online portal for both students and parents. Suttons Bay has a portal for parents, but not one for students, and The Pathfinder School has one for students, but not for parents.

One-to-One Device Implementation

Many schools across the country are putting advanced computing power into the hands of every student. From tablets to laptops, Android to Apple, schools are examining opportunities for leveraging technology to expand opportunities for learning within and outside the classroom.

The One-to-One Device Implementation metric measures the implementation status of one device per student initiatives across the community. Schools responding to the K-12 Education Technology Survey were asked the question, "Does the school have a one-to-one device initiative or allow students to bring their own devices to school to access school-related and organized content and

applications?" Respondents were asked to answer in a way that indicates their current stage of implementing a one-to-one program.

The four public school districts indicate that they have all successfully implemented a 1:1 device program with devices supplied by the school. St. Mary School is currently piloting a 1:1 program with a sample of students and staff, and The Pathfinder School is in the exploratory phase of implementing such a program.

Device to Student Ratio

This metric measures the ratio of Internet-enabled devices to students for the entire K-12 community. This metric is related to the one-to-one device program and is designed to identify places where technology is thinly spread among students in a community. One-to-one device programs allow all students to have individual access to technology, content, and resources; however, in communities without one-to-one device initiatives, technology is often shared in labs or individual classrooms among all students.

The device-to-student ratio is calculated by collecting the total number of devices and students from districts responding to the K-12 Education Technology Survey. Survey

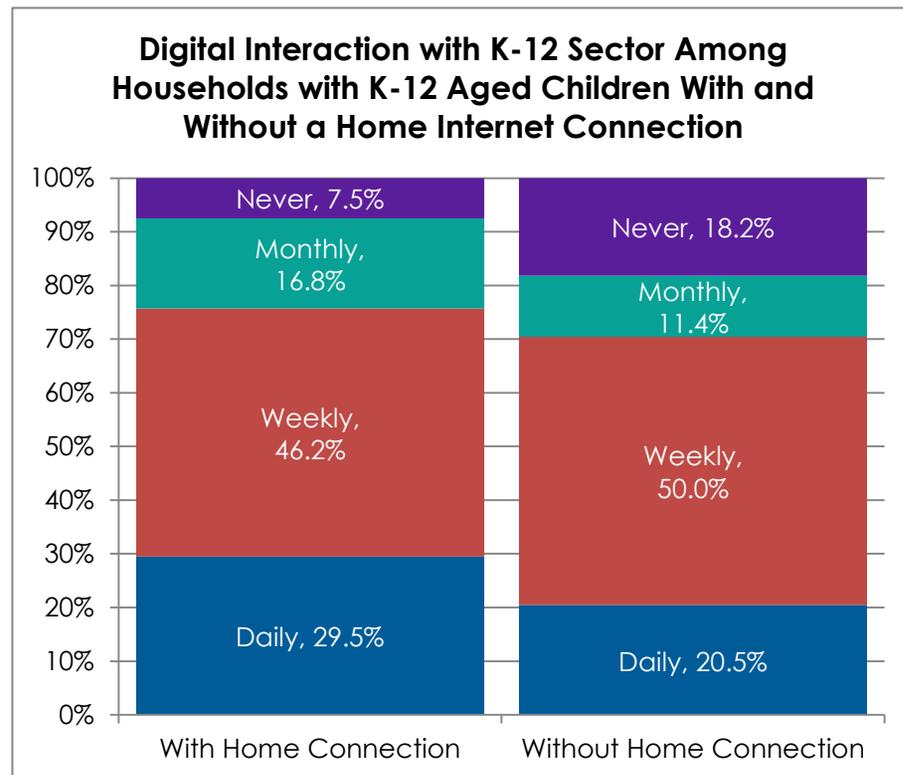
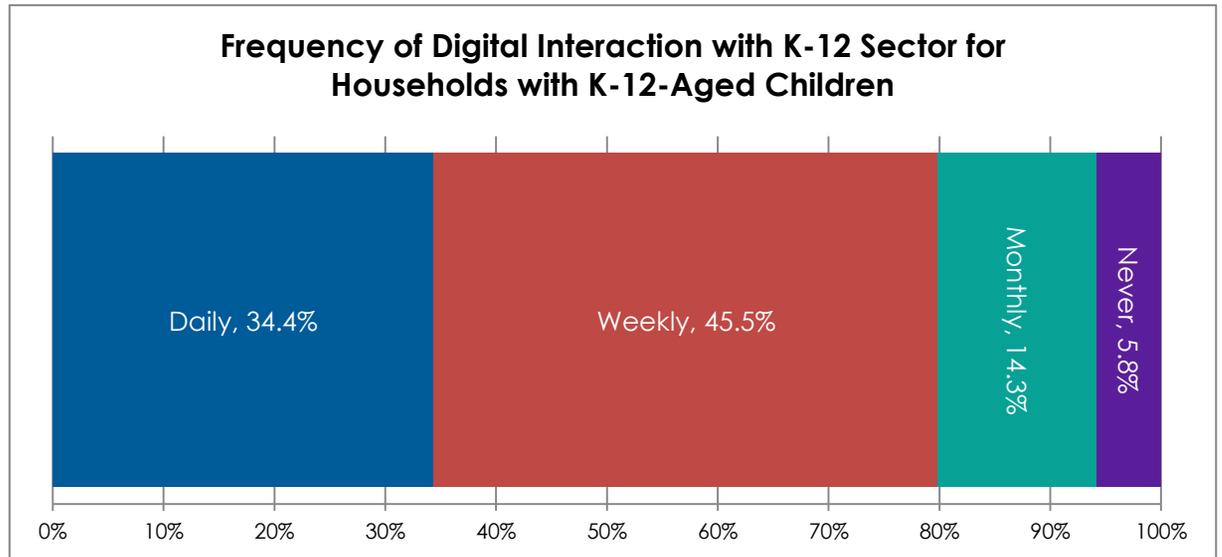
respondents indicate a total of 2,299 students along with a total of 3,202 devices for a device-to-student ratio of 1.39. This indicates that, overall, there are more than enough devices (e.g. laptop, desktop, or tablet) available to each student in the community.

Community Awareness

The Community Awareness metric measures the frequency with which residents with school-aged children state they digitally interact with K-12 schools. This metric can be thought of as the inverse of the analysis of digital communication tools used by schools. Respondents of the Residential Technology Survey were asked to indicate the regularity with which they access online information from or interact electronically with K-12 education. Survey results indicate that households with K-12 children interact electronically with K-12 schools several times each week.

The table provides a distribution of the various responses among survey respondents. More than one-third of respondents (34.4%) have at least daily digital interaction with K-12 schools. Only 5.8% of respondents state they never electronically interact with K-12 schools.

Additionally, survey responses provide a glimpse into how frequently broadband adopting and non-adopting households with K-12 aged children digital interactive with K-12 schools. K-12 households without a home internet connection digitally interact with K-12 schools less frequently than those with a home connection. K-12 households without a broadband connection are more than twice as likely to never digitally interact with K-12 schools than those with a home connection.



Use/Government

Residents and businesses in a community are served by several local units of government. From municipalities such as cities, villages, and townships to counties, regional development groups, and others, communities are comprised of several overlapping jurisdictions all with varying responsibilities. Internet connectivity, and related broadband-enabled applications, allows municipalities to take advantage of new and innovative ways to deliver existing or additional services to the public. E-government services allow citizens to conduct business and communicate with their local units of government more efficient and conveniently, allowing for great civic participation and effectual use of public resources.

The Government focus area has four metrics that measure the Use of broadband and related technologies among the local units of government within the community. There are 16 units of government within the Leelanau Peninsula, including Leelanau County itself, and are: a small portion of the City of Traverse city; the villages of Empire, Northport, and Suttons Bay; and the townships of Bingham, Centerville, Cleveland, Elwood, Empire, Glen Arbor, Kasson, Leelanau, Solon, and Suttons Bay.

Surveys were distributed to all local units of government within the community. Of the 16 units identified, seven responded to the survey providing insight into their broadband access and use. These seven include Leelanau County, Village of Northport, Village of Empire, Suttons Bay Township, Kasson Township, Glen Arbor Township, and Leelanau Township. Metrics for the Government focus area include a website analysis, advanced website features, frequency of digital communication, and community awareness.

Use/Government Highlights

42.8% Municipalities with download speeds greater than 50 Mbps

6.7/10 Average municipal website analysis score

21.7% Residents who say they never digitally interact with local government

50% Municipalities with a social media presence

Government Connectivity

Just as with residents, businesses, and other institutions, the broadband connectivity available to and adopted by municipalities allows or limits the ability of that entity to offer e-government services to citizens. As they government connectivity table shows, the connection speed of municipalities varies greatly across the county, as does the type of connection providing service to these entities. Additionally, Glen Arbor Township, Leelanau County, and Leelanau Township offer free Wi-Fi to the public at their location.

Website Analysis

The website of a local government may be the first point of contact a resident or business may have with the municipality when an issue arises or information is required. The websites of local governments, therefore, should provide relevant information for their citizens in an easily accessible and flexible digital environment.

The Website Analysis metric examines the accessibility, experience, marketing, and technology aspects of the websites of the community's local governments. This analysis is conducted using an online website analysis tool.

Leelanau County hosts and maintains the websites for all responding municipalities except Glen Arbor Township. The table below provides the scores for each of the two websites tested.

Both tested websites lack integration with the municipalities' official social media platforms (if used). Additionally, the analysis found code quality issues with the Leelanau.cc website,

and the Glen Arbor Township website does not use analytics code to provide the township with insights on the site's visitors.

The Municipal Website

Analysis table also contains a link to the full website analysis report for each participating community. Each report features details on the various aspects of every website with recommendations for improving the appearance, accessibility, and function of the site.

Advanced Website Use

A website is one of the most basic ways in which any institution establishes an online presence. Having robust, interactive, and communicative features on that website makes the user experience more efficient and impactful. The Advanced Website Use metric measures the average number of more advanced website features implemented across the websites of municipalities in the community. Ten advanced website features were assessed. While the website analysis metric examines website structure and functionality, the advanced use metric examines best practices for an enhanced user experience.

The Leelanau.CC website uses six of the advanced website features. Features that are missing include general contact information

| Government Connectivity | | |
|-------------------------|---------------------------|-----------------|
| Municipality | Connection Download Speed | Connection Type |
| Glen Arbor Township | 50 Mbps to 99.99 Mbps | Cable Internet |
| Kasson Township | 25 Mbps to 49.99 Mbps | DSL Internet |
| Leelanau County | 10 Mbps to 24.99 Mbps | Cable Internet |
| Leelanau Township | 50 Mbps to 99.99 Mbps | Cable Internet |
| Suttons Bay township | 25 Mbps to 49.99 Mbps | Cable Internet |
| Village of Empire | 25 Mbps to 49.99 Mbps | Cable Internet |
| Village of Northport | 50 Mbps to 99.99 Mbps | Cable Internet |

on the homepage, integration with social media, login for clients/staff, etc., and a stated privacy policy. The Glen Arbor Township website also uses six of the advanced features. Those missing include transactional functions, social media integration, login for clients/staff, etc., and an online feedback mechanism.

Frequency of Digital Communication

Digital communications tools are critical for municipalities to communicate with the public and encourage public participation in all matters of public interest. From public safety updates on social media to live video streaming of public meetings, there are a number of ways in which municipalities can digitally communicate with their citizens. This metric examines the use of digital communications tools by each municipality.

Survey responses indicate that municipalities in the county use digital tools to communicate with the public approximately once per month.

Digital communications tools vary widely in their use and applicability for municipalities. Among the seven responding municipalities,

| Municipal Website Analysis | | | | | | | |
|----------------------------|--------------------------------------------------------------------------|---------------|------------|-----------|------------|---------------|-----------------------------------------------------------|
| Municipality | URL | Accessibility | Experience | Marketing | Technology | Overall Score | Full Report |
| Leelanau.CC* | www.leelanau.cc | 7.9 | 6.5 | 5.4 | 6.3 | 7.0 | http://bit.ly/2fqL1yQ |
| Glen Arbor Township | www.glenarbortownship.com | 8.7 | 6.6 | 4.3 | 7.1 | 6.5 | http://bit.ly/2fiTgys |

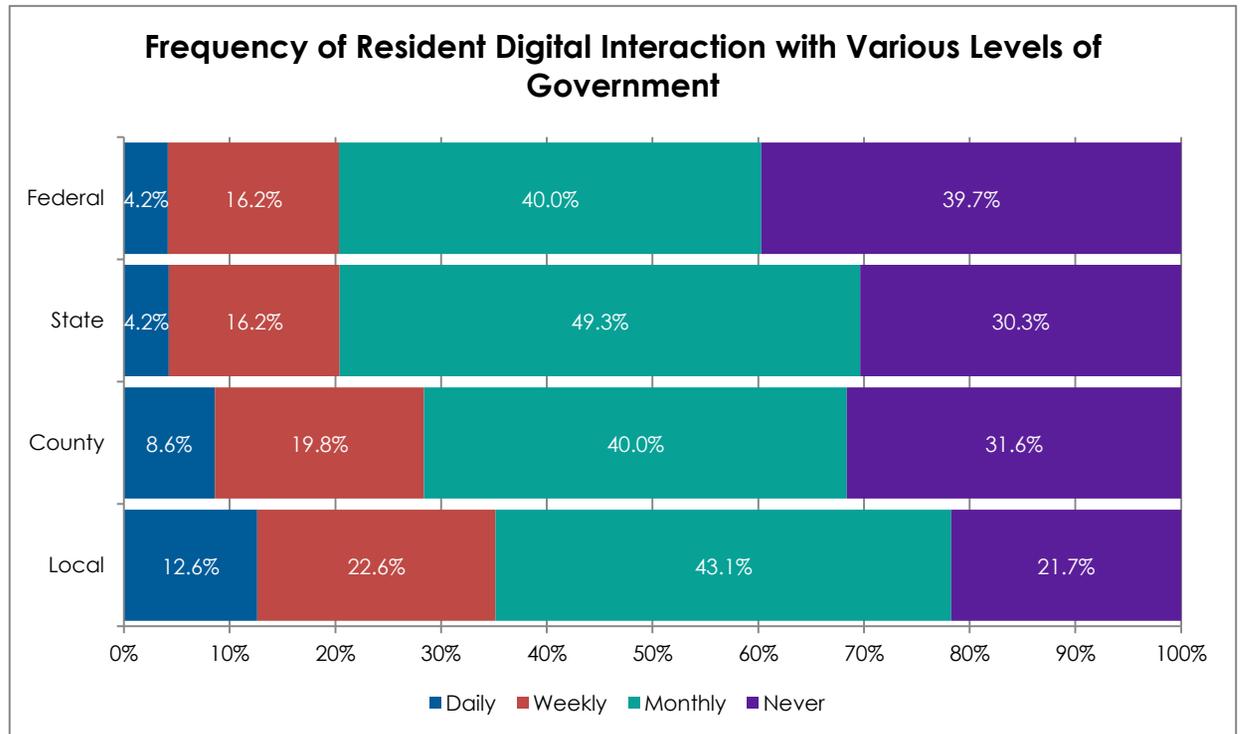
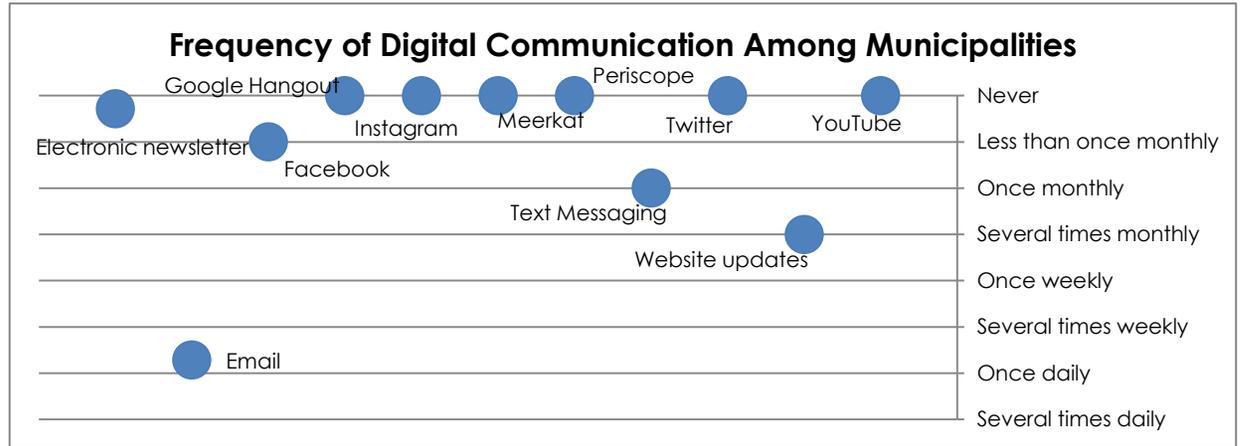
*Leelanau County hosts and maintains the websites for all responding municipalities except Glen Arbor Township.

email is the most commonly used digital communications tool (used at least daily) followed by website updates, which occurs several times per month, on average. Facebook is the most commonly used social media platform among Leelanau Peninsula municipalities with Glen Arbor Township and the Village of Northport using it less than monthly and Leelanau County using it several times per week. Other social media platforms analyzed, including Instagram and Twitter, are never used by municipalities. Similarly, video-based tools (i.e. Google Hangouts, Meerkat, Periscope, and YouTube) are also never used.

Community Awareness

The Community Awareness metric measures the frequency with which residents state they digitally interact with local government. This metric can be thought of as the inverse of the analysis of digital communication tools used by each municipality. Respondents of the Residential Technology Survey were asked to indicate the regularity with which they access online information from or interact electronically with local government entities. Survey responses indicate that residents actively or passively interact electronically with local or county government on a monthly basis.

Expectedly, residents digitally interact more frequently with their local governments than with higher levels of organization. Nearly four-fifths (78.3%) of residents interact electronically with local government with some frequency while the balance indicate that they never do so. Nearly a third of residents (31.6%) say they never interact with county government, while 30.3% say they never interact with state government online. Residents that more frequently digitally interact with local government (those that do so at least weekly) include adults aged 18-34, those aged 55-64, those with some college education, but no degree, and the self-employed. Households



with incomes less than \$35,000, annually, also tend to digitally interact with local government more frequently than others as do households with active or retired veterans.

Use/Economic Prosperity

Positive economic activity in a community depends on the success of its private sector business establishments to develop new and innovative products, provide services, attract investment, and create jobs. Small business establishment and growth, entrepreneurship, and innovation are hallmarks of the American economic system, and Internet connectivity coupled with new technology, devices, and applications are perpetuating these ideals in new and exciting ways.

The Economic Prosperity focus area has eight metrics that measure the Use of broadband and related technologies in the community among two groups; 1) private-sector business establishments across all sectors (except agriculture and healthcare), and 2) the community's economic development organizations and associations. This structure

ensures that technology use is not only promoted for use by businesses, but also among the organizations that work to attract, retain, and grow the economy of the community. Two surveys were distributed throughout the community to capture information for this section. The Business Technology Survey received responses from 75 businesses across the Leelanau Peninsula, representing 10% of the total (749) businesses in the community. Two Economic Development related organizations were identified in the county and provided information for the survey: Networks Northwest and Northern Initiatives.

The Economic Prosperity metrics among businesses include broadband adoption, website use, advanced application implementation, frequency of digital communication, and community awareness. Among economic development support organizations, metrics include website analysis, website advanced features, and frequency of digital communication.

Use/Economic Prosperity Highlights

96%

Businesses with an Internet connection

81%

Businesses with a website

Businesses with low rates of website use

- ✓ Less than 5 employees
- ✓ Revenue less than \$500K
- ✓ Businesses older than 23 years

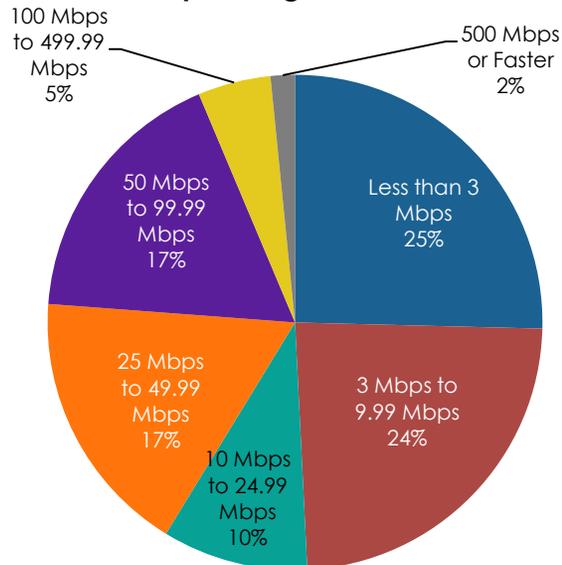
43.7%

Businesses currently or planning to use more advanced technology

24.6%

Residents digitally interacting with local businesses weekly

Connection Speed Among Responding Businesses



Business Broadband Adoption

The presence of a broadband connection can be one of the most critical needs for a business looking for a location. Competing in a global economy requires a competitive advantage, and a broadband connection and its other related technologies, coupled with the adoption and meaningful use of that technology, can provide businesses with a resource to expand their market, create operational efficiencies, and find that advantage.

The Business Broadband Adoption metric measures the percent of businesses in the community that subscribe to, or adopt, broadband at their location. In 2014, the Leelanau Peninsula had 749 business establishments, according to the United States Census County Business Pattern data. Slightly more than 96% of businesses responding to the survey indicate they have a broadband

connection.

Nearly half of responding businesses (49%) indicate they have an internet download speed of less than 10 Mbps (see chart on previous page). Only 7% of businesses connect with a download speed of 100 Mbps or faster.

Most businesses connect to the web over a cable or DSL network. Additionally, many businesses utilize a satellite connection. Satellite internet connections are often indicative of a lack of wired or more fixed internet service. Only 7% of businesses do not know the speed of their internet connection.

The majority of responding businesses in the community (42%) pay between \$50 and \$75 per month for internet service. The cost of service is generally related to the subscribed to download speed for the business, but some businesses pay more for the same level of service than others.

Additionally, 29.4% of responding businesses indicate that they offer free Wi-Fi connectivity to the public at their location.

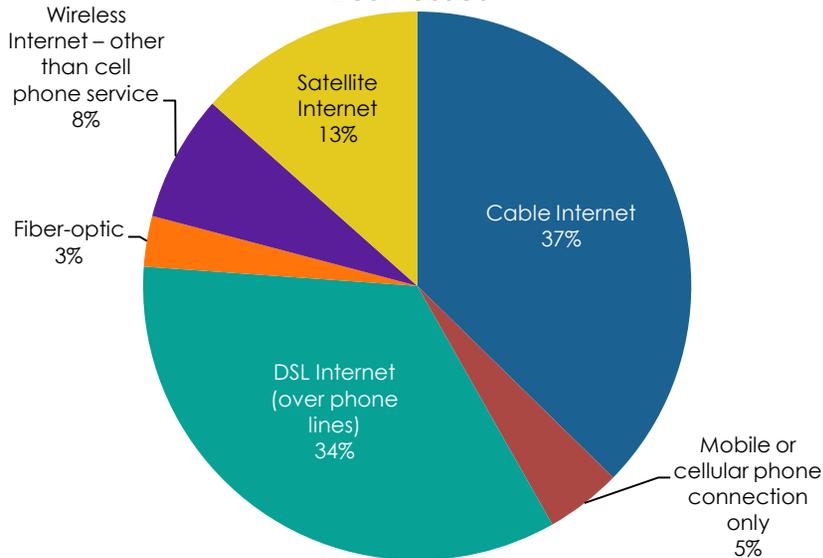
Business Website Use

A website is one of the most basic ways in which a business establishes an online presence. A website provides a “virtual face” for a business.

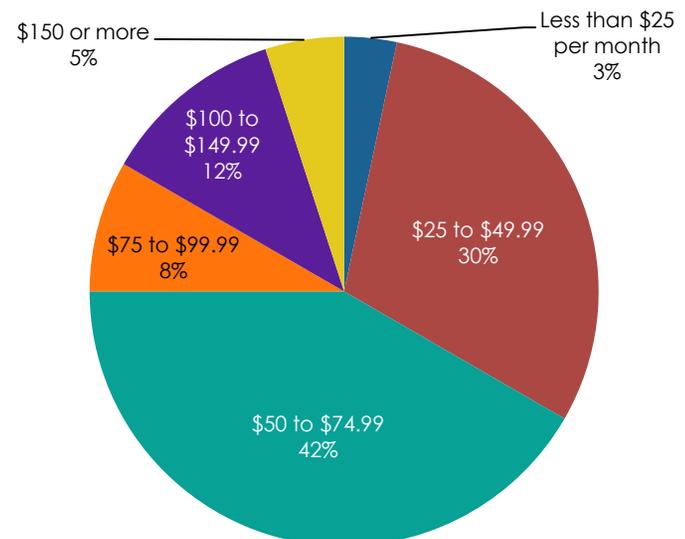
According to the Business Technology Survey, 81% of responding businesses in the Leelanau Peninsula have a website. Further analysis reveals that website use varies greatly across businesses of different sizes, revenue, and type.

The following charts examine website use among responding businesses in the community by a number of different factors. Generally, businesses with more than 15 employees tend to have a website more frequently than smaller establishments.

Connection Type Among Responding Businesses



Monthly Connection Costs Among Responding Businesses



Similarly, website use is more universal among businesses with annual revenue greater than \$500,000. There appears to be no relationship between having a website and business age.

Advanced Applications

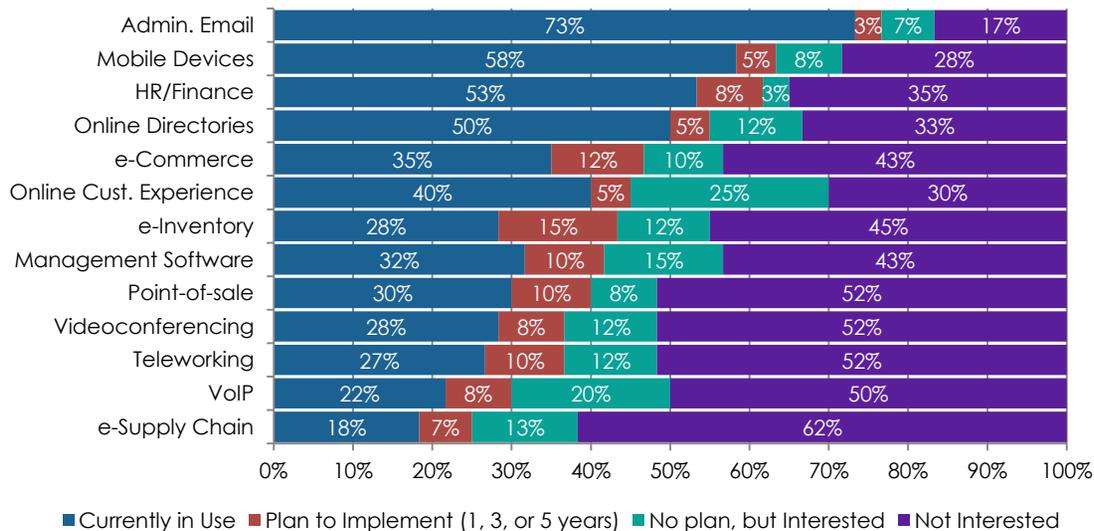
Beyond a website, there are many Internet-enabled technologies that can benefit businesses of all types. These technologies are aimed at increasing revenue and reducing expenditures to give businesses a competitive advantage. In the Business Technology Survey, respondents were asked to identify the advanced applications of technology they are currently using or plan to implement. In the Leelanau Peninsula, 43.7% of businesses either currently use or plan to implement the advanced applications within one year. The advanced applications include:

- Electronic inventory device or software
- Electronic supply chain management

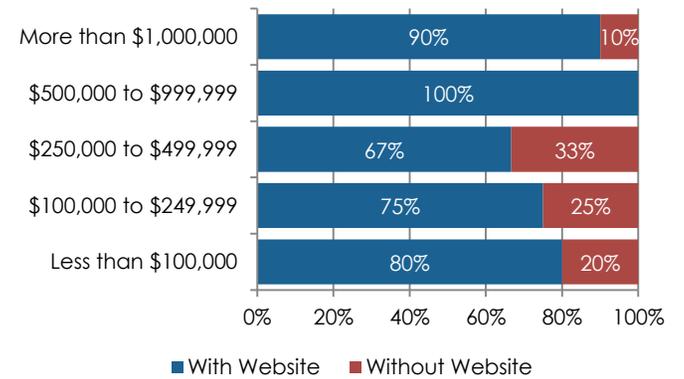
- resources
- E-mail service for at least 75% of administrative staff
- Employer-issued mobile device for at least 50% of administrative staff
- Human resources or finance-related software
- Participating in industry-specific online directories and aggregation services
- Industry-specific management or performance monitoring software
- Interactive online customer experience
- Point-of-sale software
- Teleworking policy for employees
- Videoconferencing used regularly
- Voice-over Internet Protocol (VoIP) phone service
- Web-based e-commerce application

The three most common applications currently in use included e-mail service for at least 75% of administrative staff (73%),

State of Advanced Application Implementation Among Businesses



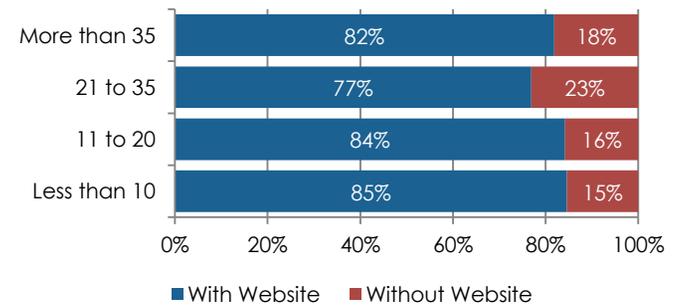
Website Use by Annual Revenue



Website Use by Number of Employees



Website Use by Age of Establishment



employer-issued mobile devices for 50% of staff (58%), and human resources or finance software (53%). The majority of businesses had not implemented teleworking policies for employees (27%), voice over internet protocol (VoIP) phone service (22%), or electronic supply chain management (18%). The chart provides more information on the implementation state of each advanced application across all businesses.

While not every business has a need for every one of these advanced applications, there may be opportunities to leverage these technologies to help sustain and grow businesses in the community.

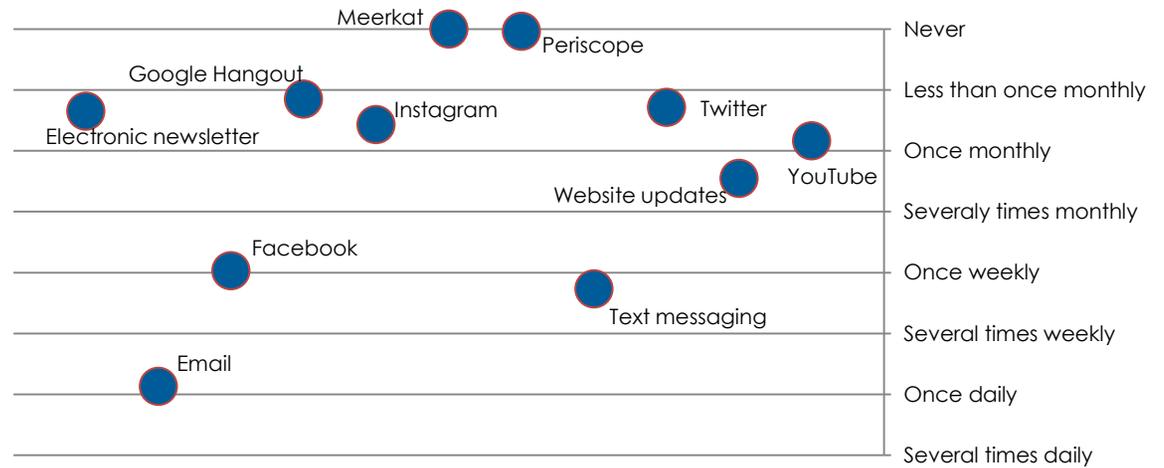
Among respondents, 8.2% state that they plan to implement one or more of the advanced applications within the next five years. More interesting are the 12% of businesses that state they have no plan to implement one or more of the advanced applications but are interested in the technology. Furthermore, businesses with five to fifteen employees and businesses with annual revenues between \$50,000 and \$150,000 are the most ripe for implemented more advanced applications. These groups indicated greater interest in implementing advanced technology more than other groups. These businesses represent an opportunity for the community to educate and build awareness for how technology can enhance a business plan.

Business Frequency of Digital Communication

Similar to the use of Internet-enabled technologies, broadband also enables businesses to communicate electronically with clients, potential customers, and colleagues. The Business Frequency of Digital Communication metric examines how often local businesses are leveraging digital tools and social media.

Survey responses indicated that businesses use digital tools to communicate with the public

Frequency of Digital Communication Among Local Businesses



between several times each month and once weekly.

The chart shows the average frequency of use for each of the digital communications tools included in the survey. E-mail, text messaging, and Facebook are the three most popular tools among businesses. Website updates, Youtube, and Instagram represent the next most popular platforms for digital communication. Google Hangouts is likely used for video calling or video conference meetings. Other video-based social media such as Meerkat and Periscope are rarely used.

Further examination of the data reveals several interesting points:

- Businesses with at least 20 employees are the most frequent users of digital communications tools. These establishments are frequent users of social media including Facebook, Instagram, and Twitter. On average, these businesses use social media at

least weekly. Text messaging and email are used several times a day or week among this group.

- Upon examining revenue, businesses with annual revenues between \$500,000 and \$2,000,000 are the most prolific users of digital communications tools. With this group, Facebook, email, and updates to the website are used several times per day.
- Often times, businesses without a website instead opt to use social media as their primary online presence. This does not appear to be the case, however, among businesses in the Leelanau Peninsula. Businesses with website are far more likely to use social media and other digital communications tools than those without.

Organization Website Analysis

Communities often have at least one entity responsible for economic development activities. These organizations are tasked with

working to attract new business to the community and support existing and start-up establishments to grow the economy of the area. The website of these organizations may be the first point of contact a potential business or site selector has with the community as they seek a location. The websites, therefore, of these organizations should provide relevant information for their target audience in an easily accessible and flexible digital environment.

The Organization Website Analysis metric examines the website accessibility, experience, marketing, and technology aspects of organizations in the community that support economic development. This analysis is conducted using an online website analysis tool.

Two organizations have been identified in the community; 1) Networks Northwest, and 2) Northern Initiatives. The website URL and associated scores are located in the table.

Networks Northwest received an overall score of 6.9 for their website. The website is not optimized for printing and there are coding issues with some of the images used on the site. However, the site integrates well with social media accounts, is optimized for viewing on mobile devices, and uses analytics software to provide feedback on visitor behavior. The full report with recommendations can be found here: http://nibbler.silktide.com/en_US/reports/www_networksnorthwest.org.

Northern Initiatives received a score of 7.7. There are basic code issues with the site, and it is not optimized for printing. However, the site

is optimized for viewing on mobile devices and uses analytics software to track visits. The full report with recommendations can be found here:

http://nibbler.silktide.com/en_US/reports/www_northerninitiatives.org.

Organization Advanced Website Use

A website is one of the most basic ways in which an institution establishes an online presence. Having robust, interactive, and communicative features on that website makes the user experience more efficient and impactful. The Advanced Website Use metric measures the average number of more advanced website features implemented across the websites for economic development organizations in the community. Twelve advanced website features were assessed. While the website analysis examines website structure and functionality, the advanced use metric examines best practices for an enhanced user experience.

Between the two identified organizations, Networks Northwest employs nine of the eleven advanced features while Northern Initiatives uses eight. Networks Northwest is missing transactional functions and a login for clients/staff/etc. Northern Initiatives is missing login for clients/staff/etc., newfeed for frequent updates, and an online feedback mechanism.

Organization Frequency of Digital Communication

Digital communications tools are critical for economic development organizations to converse with potential businesses and site

selectors as well as to market the assets of a community. Similar to the Business Frequency of Digital Communications, this metric examines the use of digital communications tools by the community's organizations that support economic development activities.

Survey responses indicate that the two economic development organizations use digital tools to communicate with the public approximately once per month. Some tools are used more frequently than others, however.

The digital communications strategy varies greatly between Networks Northwest and Northern Initiatives. Networks Northwest uses digital communications tools at least weekly. Leveraged platforms include email, electronic newsletters, Google Hangouts, Facebook, text messaging, and daily website updates.

Northern Initiatives uses a smaller set of tools less frequently. Platforms used include email, Facebook, and monthly website updates. Additionally, Northern Initiatives is a frequent Twitter user, while the Twitter platform is not used by Networks Northwest.

Community Awareness

The Community Awareness metric measures the frequency with which residents state they digitally interact with local businesses. This metric can be thought of as the inverse of the analysis of digital communication tools used by local businesses. Respondents of the Residential Technology Survey were asked to indicate the regularity with which they access online information from or interact electronically with local businesses. Survey

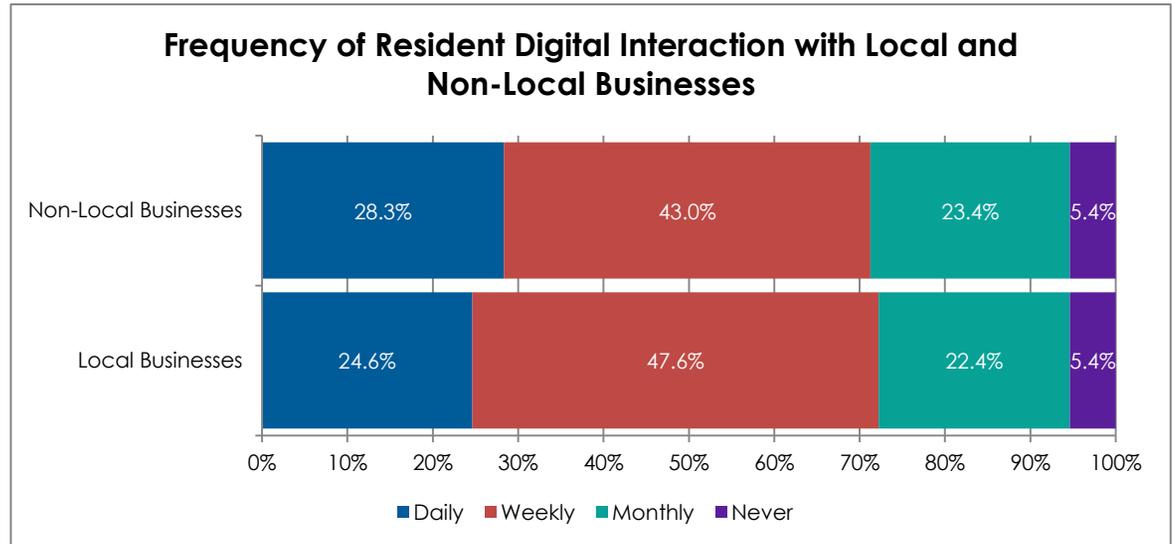
| Organization | URL | Accessibility | Experience | Marketing | Technology | Overall Score |
|----------------------|------------------------------------------------------------------------------|---------------|------------|-----------|------------|---------------|
| Networks Northwest | www.networksnorthwest.org | 7.1 | 6.1 | 6.8 | 6.1 | 6.9 |
| Northern Initiatives | www.northerninitiatives.org | 8.3 | 7.6 | 6.8 | 6.7 | 7.7 |

responses indicate that residents digitally interact with local businesses several times per week.

The chart provides a distribution of the various responses among survey respondents. Daily digital interaction occurs for nearly one-quarter of residents in the community, and nearly half (47.6%) of residents in the community digitally interact with local businesses at least once per week. Only a small percentage of residents (5.4%) state they never digitally interact with local or non-local businesses.

Non-local establishments enjoy slightly more daily digital interaction with residents, when compared to the frequency with which residents indicate they interact with local businesses. However, both local and non-local businesses enjoy the same amount of digital interaction (daily, weekly, or monthly) among residents.

Residents indicating more frequent online interaction with local businesses include adults aged 35-44, ages 55-64, those with an associate's or bachelor's degree, those employed part-time or that are self-employed.



Use/Tourism

Many communities rely on travel and tourism for a majority of their local economic activity. The travel and tourism industry is not defined by any one business type, but includes many different types of businesses that contribute to a local tourism economy. Tourism and travel-oriented businesses depend on customer attraction and retention, marketing, and creating relevance in new markets. Information and communications technologies have dramatically impacted the tourism industry, or rather the way in which the tourism industry conducts many of its operations and functions. An online presence for tourism and travel-oriented businesses is imperative for success in the twenty-first century. Technology adoption and use among businesses in communities whose economy is primarily dependent on tourism is even more critical. From website development, social media, and aggregate booking portals, to map applications and customer review and rating services, there are many, simple ways tourism businesses can leverage broadband and related technology to sustain and grow their business.

The Tourism Use focus area contains metrics similar to the Economic Prosperity Use focus area. Data for this metric is gathered from the Business Technology Survey, but while the Economic Prosperity section examines all businesses, the Tourism section focuses on businesses that have self-identified as part of the local travel and tourism economy.

The Tourism focus area has eight metrics that measure the Use of broadband and related technologies in the community among two groups; 1) private-sector business establishments that self-identify as being part of the local tourism economy, and 2) the community's travel and tourism-oriented supporting organizations and associations. This

structure ensures that technology use is not only promoted for use by businesses, but also among the organizations that work to promote and market the community's tourism activities and venues. The Business Technology Survey received responses from 75 businesses, 37 of which self-identified as part of the local tourism economy in the Leelanau Peninsula. One tourism-related support organization, Leelanau Peninsula Chamber of Commerce, was identified and responded to the survey.

The Tourism metrics among businesses include broadband adoption, website use, advanced application implementation, frequency of digital communication, and community awareness. Among travel and tourism support organizations, metrics include website analysis, website advanced features, and frequency of digital communication.

Use/Tourism Highlights

- 86.4% Tourism businesses with a website
- 8.1% Tourism businesses wishing to participate in online aggregation services
- Weekly Social media rate of use for the Chamber of Commerce
- 45% Tourism businesses currently using or planning more advanced technology implementation

Tourism Business Broadband Adoption

The presence of a broadband connection can be one of the most critical needs for a travel/tourism business. Competing in a global economy requires a competitive advantage, and a broadband connection coupled with the adoption and meaningful use of related technology, can provide tourism businesses with a resource for expanding their market and creating operational efficiencies.

The Business Broadband Adoption metric measures the percent of travel and tourism-oriented businesses in the community that subscribe, or adopt, broadband at their location. Of the 75 businesses responding to the survey, nearly half (49.3%) identified themselves as part of the local tourism economy (since tourism crosses several

traditional industry classifications). Results from the Business Technology Survey indicate that nearly 100% of responding tourism businesses subscribe to broadband service (a rate higher than that for all businesses in the community).

Approximately half of tourism businesses connect to the internet with a download speed less than 25 Mbps. Compared with all businesses, however, tourism establishments are more likely to have a connection faster than 25 Mbps.

The vast majority (80%) of tourism businesses pay between \$25 and \$75 per month for their internet service. Cable networks account for 46% of tourism business connections, DSL providers for 27%, and a mixture of fixed wireless, satellite, and fiber-optic connections comprise the balance of connectivity types for tourism businesses.

Additionally, 40% of responding tourism businesses say they offer free Wi-Fi to the public. This is higher than the rate of 29.2% among all businesses in the community.

Tourism Business Website Use

A website is one of the most basic ways in which a tourism business establishes an online presence. A website provides a “virtual face” for a business. The online presence of tourism businesses is particularly important given the desire and trend of travelers to “explore” a place virtually and make decisions regarding attractions, accommodations, and dining before physically visiting the location.

According to the Business

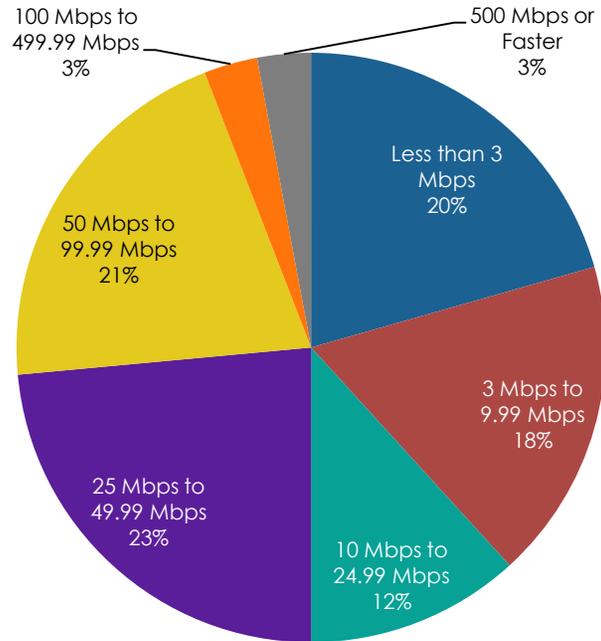
Technology Survey, 86.4% of self-identified tourism businesses in the Leelanau Peninsula have a website. This is higher than the rate of 81% website use among all businesses.

Advanced Applications

Beyond a website, there are many Internet-enabled technologies that can benefit tourism businesses. These technologies are aimed at increasing revenue and reducing expenditures to give businesses a competitive advantage, or expanding the awareness and public image of the establishment. In the Business Technology Survey, respondents were asked to identify the advanced applications of technology they are currently using or plan to implement. In the Leelanau Peninsula, 45% of responding self-identified tourism businesses either currently use or plan to implement the advanced applications within one year (a rate slightly higher than that for all businesses in the community. The advanced applications include:

- Electronic inventory device or software
- Electronic supply chain management resources
- E-mail service for at least 75% of administrative staff
- Employer-issued mobile device for at least 50% of administrative staff
- Human resources or finance-related software
- Participating in industry-specific online directories and aggregation services
- Industry-specific management or performance monitoring software
- Interactive online customer experience
- Point-of-sale software
- Teleworking policy for employees
- Videoconferencing used regularly
- Voice-over Internet Protocol (VoIP) phone service
- Web-based e-commerce application

Connection Speed for Tourism Businesses

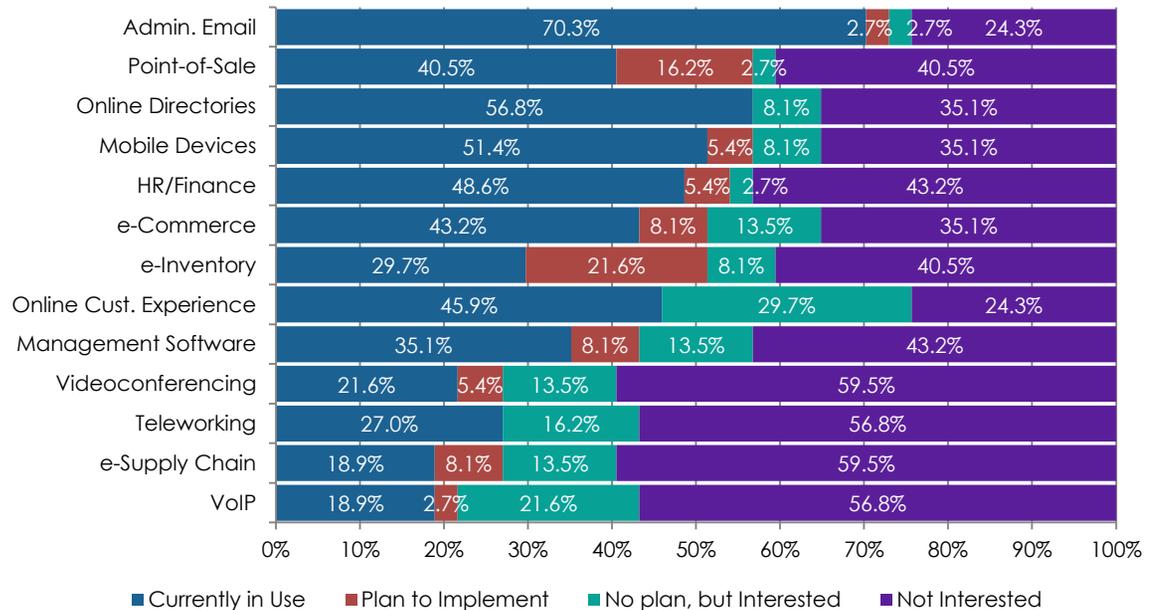


The chart provides more information on the current, and future, implementation of advanced web-enabled applications. Among tourism-oriented businesses, the three most commonly used advanced applications include e-mail service for at least 75% of administrative staff (70.3%), participating in industry-specific online directories and aggregation services (56.8%), and employer issued mobile devices for at least 50% of administrative staff. There is no shortage of online business directories that cater to the tourism industry. Trip Advisor, Expedia, Yelp, and others provide a way for customers to rate, review, and research tourism-oriented businesses. There were no responding tourism businesses indicating they planned to participate in online industry directories, however, 8.1% said they had no plan to do so, but were interested.

Least commonly used among tourism businesses were a teleworking policy (27%), e-supply chain management applications (18.9%), and voice-over IP telephone service. These infrequently used applications are not surprising given the customer-facing nature of the tourism industry. Travel and tourism employment is place-based and does not lend itself to teleworking for most occupations, and tourism businesses typically don't rely on a dedicated supply chain for operation.

The chart shows several opportunities for improving the use of technology are found in the chart. Nearly 30% of tourism businesses have no formal plan to implement an online customer experience, but are interested in doing so. Nearly one-fifth (16.2%) of responding businesses stated they are interested in exploring telework opportunities for their employees, and 21.6% would like to examine the feasibility of VoIP phone service. These businesses do not currently have plans to undertake these activities. Training and awareness programs on implementing both of

State of Advanced Application Implementation Among Tourism-Oriented Businesses



these applications would be beneficial to the tourism industry.

Tourism Business Frequency of Digital Communication

Similar to the use of Internet-enabled technologies, broadband also enables tourism businesses to digitally communicate with clients, potential customers, and colleagues. The Tourism Business Frequency of Digital Communication metric examines how often local tourism businesses are leveraging digital tools and social media.

Survey responses indicate that tourism-oriented businesses use digital tools to communicate with the public between several times each month and once per month.

The chart shows the average frequency of use for each of the digital communications tools included in the survey. E-mail and Facebook are the two most popular digital communications tools among tourism businesses. Text messaging and website updates, followed by Instagram, round out the top five. Similar to the rate for all businesses, video media such as Google Hangout, Meerkat, Periscope, and YouTube are rarely if ever used. Tourism businesses tend to use social media more frequently than other businesses. Facebook is used about once per day and Twitter and Instagram several times per month. For some businesses, social media may be more important, or even replace, the use of a traditional website.

Organization Website Analysis

Communities often have at least one entity responsible for promoting and supporting the local travel and tourism industry. These organizations are tasked with marketing the industry for the community and serving as an industry-specific association offering support to local establishments. The website of these organizations may be the first point of contact a potential visitor or convention organizer has with the community. Therefore, the websites of these organizations should provide relevant information for their target audience in an easily accessible and flexible digital environment.

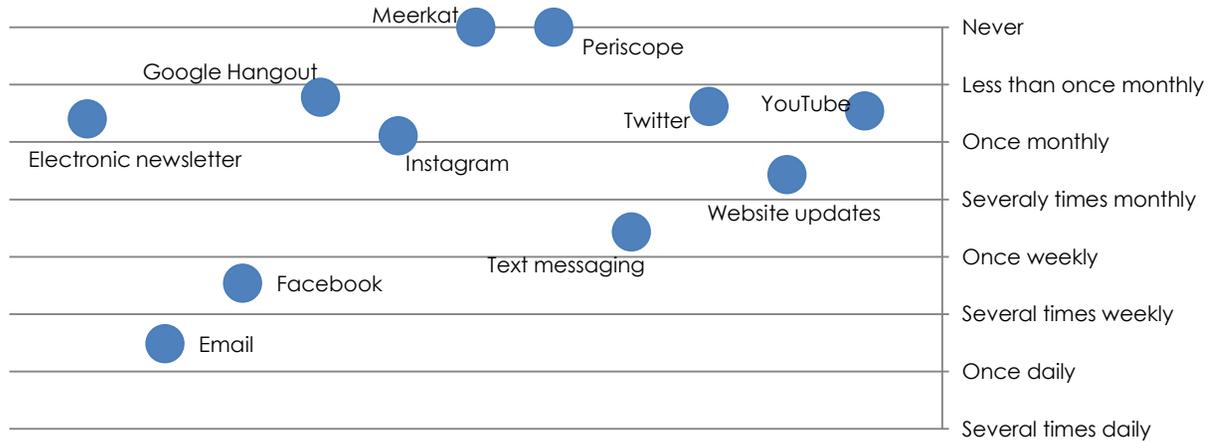
The Organization Website Analysis metric examines the accessibility, experience, marketing, and technology aspects of organizations in the community that support travel and tourism. This analysis is conducted using an online website analysis tool.

One organization has been identified as serving this role: the Leelanau Peninsula Chamber of Commerce. The website URL and associated score are located in the table.

The website of the Leelanau Peninsula Chamber of Commerce is compatible with multiple browsers and mobile devices, and uses analytics software to track users and the content they access. The site also features robust social media integration across multiple platforms. However, the website analysis found several coding issues with the site.

The complete website analysis report can be found online at http://nibbler.silktide.com/en_US/reports/www.leelanauchamber.com.

Average Use of Digital Communications Tools Among Tourism-Oriented Businesses



Organization Advanced Website Use

A website is one of the most basic ways in which an institution establishes an online presence. Having robust, interactive, and communicative features on that website makes the user experience more efficient and impactful. The Advanced Website Use metric measures the average number of more advanced website features implemented across the websites for tourism-related organizations in the community. Eleven advanced website features were assessed. While the online website analysis examines website structure and functionality, the advanced use metric examines best practices for an enhanced user experience.

The Leelanau Peninsula Chamber of Commerce website implements 9 of the 11 advanced features on their website. The only

features missing are a newsfeed for current updates and a stated privacy policy.

Organization Frequency of Digital Communication

Digital communications tools are critical for tourism organizations to market and communicate with potential visitors and the public in general. Similar to the Tourism Business Frequency of Digital Communications, this metric examines the use of digital communications tools by the community's organizations that support travel and tourism activities.

Survey responses indicate that the Leelanau Peninsula Chamber of Commerce uses digital communications tools approximately once per month across all forms of electronic media.

| Organization | URL | Accessibility | Experience | Marketing | Technology | Overall Score |
|----------------------------------------|-------------------------|---------------|------------|-----------|------------|---------------|
| Leelanau Peninsula Chamber of Commerce | www.leelanauchamber.com | 7.1 | 6.6 | 6.3 | 6.1 | 7.0 |

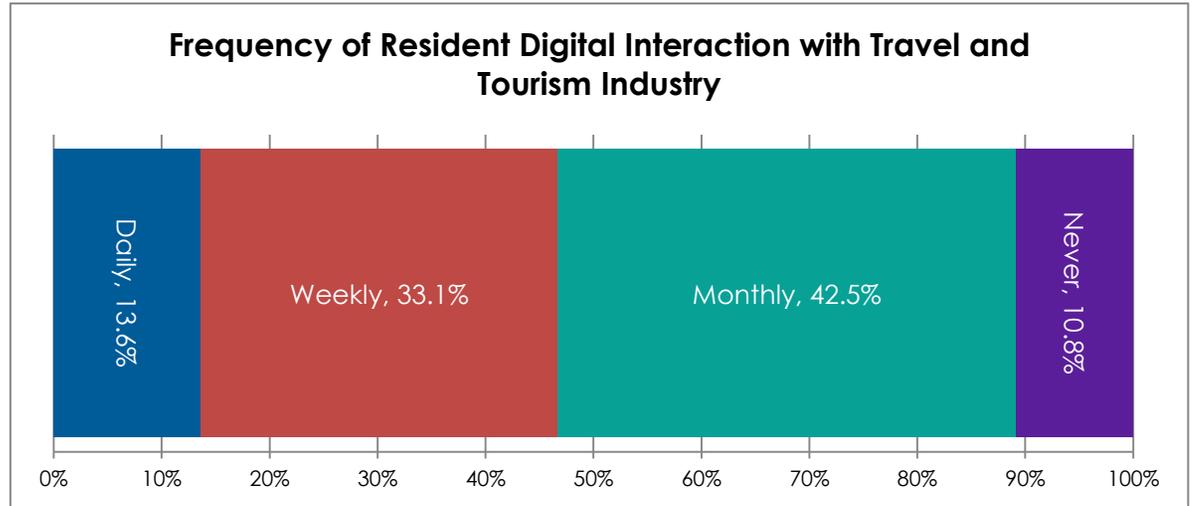
Email and Facebook are the preferred digital tool of the Leelanau Chamber. Facebook, Twitter, and Instagram are all used several times per day. Electronic newsletters are sent once per week and the website is updated less than once per month. All other digital tools included in the assessment are never used, (Google Hangouts, Instagram, Meerkat, Periscope, text messaging, Twitter, and Youtube).

Community Awareness

The Community Awareness metric measures the frequency with which residents state they digitally interact with the travel and tourism industry. Respondents of the Residential Technology Survey were asked to indicate the regularity with which they access online information from or interact electronically with the travel and tourism sector. Leelanau Peninsula residents interact electronically with the travel and tourism sector at least several times per month.

The chart provides a distribution of the various responses among residents. Nearly half (46.7%) of residents access information electronically or digitally interact with the tourism industry on at least a weekly basis, while only 10.8% state they never interact with this sector online.

Residents with higher educational attainment and higher household incomes tend to digitally interact with travel and tourism more often, as do residents aged 70 or more. While residents may or may not be digitally interacting with the local tourism industry, this analysis provides insight into the electronic communications patterns between residents and the tourism trade.



Use/ Talent and Workforce Development

The entrepreneurship, talent, and human capital, ecosystem in a community is often an informal cooperation between businesses, K-12 and higher education, and various supporting organizations. While some communities have formal facilities and structures to support these elements, this amalgam of entities contributes to the overall workforce development of a community in largely an ad hoc fashion. Internet connectivity and web-enabled technology contribute to talent and human capital development and can facilitate entrepreneurship. As technology advances and is increasingly used in the public and private sectors, the skills of the workforce must also advance.

The Talent and Workforce Development Use section comprises six different metrics. Data for these metrics is derived from several sources including the Business Technology Survey, K-12 Education Technology Survey, Libraries/Community Organizations Technology Survey, and the Residential Technology Survey.

The Talent and Workforce Development metrics include: technology skill alignment, technology training, continuing education, youth STEM+C activities, frequency of telework, and occupational technology digital literacy skills.

Use/ Talent, and Workforce Highlights

- 79.3% Employers who feel employee tech. skills match business needs
- 65.1% Employers who feel tech. training is important for business
- 1 or 2 Policies per employer that actively support continuing ed.
- 42.8% Institutions offering STEM+C activities for youth
- 39.4% Residents that telework with some frequency

Technology Skill Alignment

The technology-related skills necessary to be successful on the job are changing to keep pace with new innovations, tools, and applications that make production and services more efficient. The skills of the workforce should match the needed skills of the employer in order for establishments to take advantage of new technologies.

The Technology Skill Alignment metric measures the current technology skill alignment between employers and their employees. Respondents to the Business Technology Survey were asked how well the technology skills of their employees matched the technology needs of their business. According to survey results, the skills of the majority of the Leelanau Peninsula's employees match the skills of their employers between the categories of Well and Very Well. The chart shows the distribution of responses across all businesses.

| How well do the tech. skills of employees match the tech. needs of the business? (All Establishments) | Percent |
|--------------------------------------------------------------------------------------------------------------|----------------|
| Poor | 3.45% |
| Fair | 17.24% |
| Well | 36.21% |
| Very Well | 17.24% |
| Excellent | 25.86% |

While the skills of employees generally meet the needs of employers, there are significant variations with various business demographic groups.

Among all responding businesses, 21% stated that the technology skills of their employees only poorly or fairly met the technology needs of their business. While these responses were spread among businesses of all types, a few clusters stood out. Accommodation and Food Service establishments and Manufacturing businesses had a higher concentration of responses of "poor" or "fair" when asked

about the technology skills of their employees. Additionally, businesses with revenue between \$100,000 and \$500,000, annually, also responded with a higher proportion of similar responses. Finally, businesses with less than 10 employees also indicated "poor" or "fair" technology skill alignment with their employees.

Technology Training

If technology is ever-changing, and employee technology skills are important to meeting the needs of local businesses, then technology-related training is essential for ensuring employees keep up with the latest technology tools, devices, and applications.

The Technology Training metric examines the importance of technology-related training for employees among local businesses. Respondents to the Business Technology Survey were asked to rate the importance of technology-related training, continuing education, or professional development. According to survey results, responding local businesses in the Leelanau Peninsula feel that technology-related training and continuing education is Moderately Important. The chart shows the distribution of responses across all businesses.

| How important is tech-related training and continuing education? | Percent |
|-------------------------------------------------------------------------|----------------|
| Not Important | 15.87% |
| Slightly Important | 6.35% |
| Neutral | 12.70% |
| Moderately Important | 30.16% |
| Very Important | 34.92% |

Similar to the Technology Skill Alignment metric, there are discrepancies of technology training importance within various business demographic groups.

Among responding businesses with fewer than fifteen employees, 70% feel that technology

training for their employees is moderately or very important, (compared to 50% of larger businesses). Similarly, 67% of businesses with revenues under \$200,000 annually state that tech. training for employees is moderately or very important, (compared to 50% of businesses with revenues greater than \$200,000).

Continuing Education

The first two metrics, Technology Skill Alignment and Technology Training, examine the current state of technology knowledge of employees and the needs of employers, and the importance of training to boost the technology skills of the workforce. This metric explores the various ways in which employers contribute to and encourage technology-related training and continuing education for employees.

Respondents to the Business Technology Survey were asked to indicate whether various continuing education-related policies were in place at their establishment. Five of the policies offered for selection are those that actively support employee continuing education. The five active policies include:

- Allowing time off work to pursue training;
- Providing financial support for continuing education;
- Regularly offering on-site training by outside experts;
- Offering on-the-job training by in-house experts; and
- Providing incentives for continuing education, training, or professional development.

The survey results show that, on average, businesses in the Leelanau Peninsula have one or two of these policies in place.

Nearly three-quarters of businesses (71.4%) actively encourage continuing education among their employees, and 17.8% require

such training. Some businesses (28.5%) do not support continuing education. The table shows the distribution of responses for each of the five active continuing education policies among businesses with at least one such policy:

| Active Continuing Education Policies | Businesses Reporting Policy* |
|--------------------------------------|------------------------------|
| Time Off Work | 51.4% |
| Financial Support | 42.8% |
| On-Site Training | 31.4% |
| On-the-Job Training | 62.8% |
| Provides Incentives | 20.0% |

*Participants could choose more than one response

On-the-job training is the most commonly adopted continuing education policy, followed closely by time-off work for professional development and training.

Youth STEM+C Activities

While the technology skills, training, and continuing education of the current workforce are critical for meeting the needs of new and existing businesses, the cultivation of technology-related skills, interest, and entrepreneurial spirit in the next generation of talent is equally important.

The Youth STEM+C Activities metric examines the prevalence of STEM+C (Science, Technology, Engineering, Mathematics, and Computing) activities available to the community's youth outside of the traditional educational environment. Educational institutions, libraries, and other organizations are typically the organizers and hosts of such programming. Respondents to the K-12 Education and Libraries and Community Organizations Surveys were asked if they offer STEM+C programming to youth.

Fourteen organizations responded to these surveys (six school districts, four libraries, and four community organizations). Of these entities, six (42.8%) of them provide

opportunities for children and youth to explore STEM+C content, techniques, or careers.

Only one library identified opportunities for STEM+C exploration for youth, citing opportunities for content through the Michigan Electronic Library.

Four of the six school districts in the community stated that they provided STEM+C exploration for youth outside of the regular classroom curriculum. These activities included robotics and engineering teams, Lego club, and 3D printing.

One community organization described their program to introduce fourth grade students to nature through the study of birds and their habitats.

Frequency of Telework

Teleworking, or telecommuting, refers to working outside of the conventional workplace and communicating with it by way of telecommunications or computer-based technology. Further, telework is a form of organizing and/or performing work, where work, which could also be performed at the employer's premises, is carried out away from those premises. Teleworking is a spatially flexible work style that typically also involves greater flexibility in one's daily routine. Teleworkers typically have higher incomes and higher rates of advanced degree attainment. While traditional teleworkers are often thought of as those in management occupations or professional service industries, recently, technology has enabled new opportunities for teleworkers across the occupational and industry sector spectrum.

Teleworkers often do not register on typical measures of economic or workforce activity. Traditional economic development strategies typically involve the attraction or retention of employers. While this is a critical part of growing a local economy, telework represents

an opportunity to attract or retain employees even though their employer may not be located within the community itself, as long as those employees have access to advanced broadband infrastructure. Nationally, approximately 20-25% of the workforce teleworks with some frequency.

The Frequency of the Telework metric examines the regularity with which residents in the community telework or telecommute. Respondents to the Residential Technology Survey were asked, "do you currently telework or telecommute in any capacity for your job?"

According to survey results, 39.4% of residents in the Leelanau Peninsula are teleworkers, a rate much higher than the national average. Current teleworkers indicate that they telework an average of several days per week.

- Nearly half (49%) of adults aged 45 to 54 report that they telework with some frequency.
- Of those who telework, more than 55% have had least a bachelor's degree, (compared to only 3% of teleworkers who a high school diploma or less).
- Most teleworkers are employed full-time (54.4%) while 30.1% are self-employed.
- Most telecommuters work from a home office (68.8%) and some work from a restaurant or coffee shop (13.1%), while only a small group work from a co-working or shared office space (5.3%) or a library (7.5%), (respondents were able to select multiple locations).

Shared or co-working office spaces can be an attractive use in city centers, small towns, and other similar environments. Oftentimes, teleworkers need to get out of their home office and socialize with other telecommuters or access office equipment too large or expensive for a home office (e.g., printers, plotters, mailing machines, etc.). A shared

office space facility can provide these functions while bringing workers into a commercial setting to patronize restaurants or other service establishments. Nearly one-third (31.1%) of those who currently telework but do not use a shared office space, stated that would use such a facility if it were available.

Additionally, there is a desire among non-teleworkers to take advantage of a telecommuting workstyle if allowed by their employer. Nearly half (48.1%) of non-teleworkers said they would telework if enabled as part of their job. Among those wishing to telework, 17.3% are aged 55 to 64 and 14.6% have household incomes less than \$35,000 annually.

According to the Business Technology Survey, 26.6% of businesses in the community have a teleworking policy for employees, 10% plan to implement such a policy within the next five years, and 11.6% are interested in implementing a telework policy. This leaves 51.6% of employers in the community that are not interested in a telework policy for employees.

Occupational Technology Digital Literacy Skills

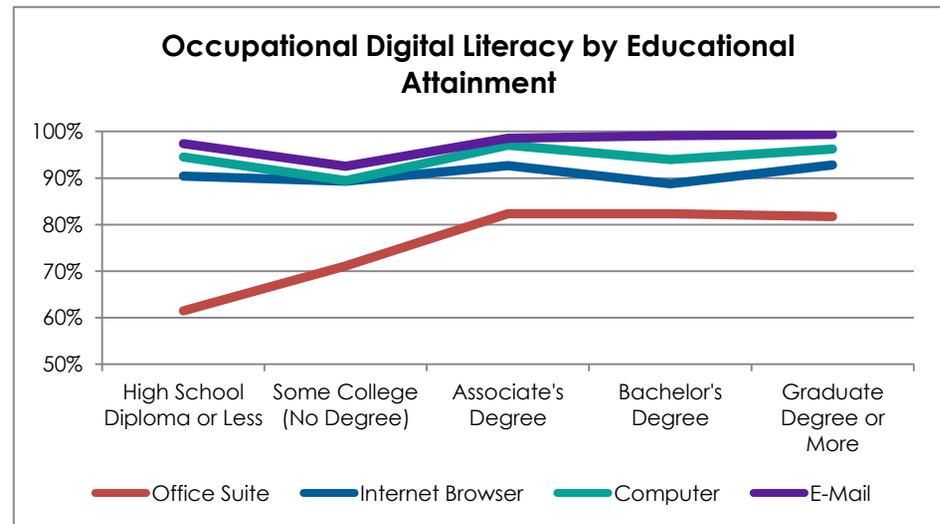
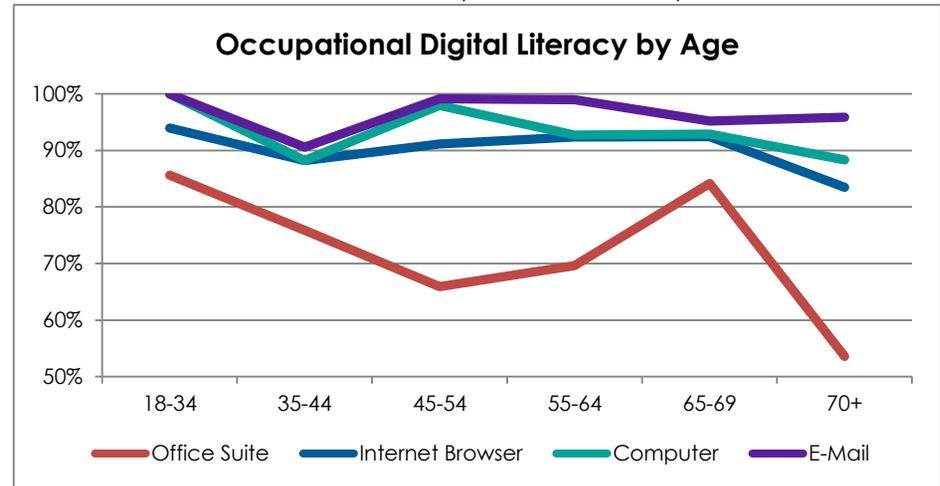
The technology skills of the workforce will need to keep pace as basic and advanced technologies continue to permeate nearly all occupations and industries. The Occupational Information Network (O*NET), curates occupational data as it relates to knowledge, skills, and abilities needed to perform a variety of activities and tasks and be successful on the job. Part of O*NET's database includes information on tools and technology used for each defined occupation. The tools and technology database attempts to identify the universe of machines, equipment, tools, software, and information technology workers may use for optimal functioning in a high performance workplace. O*NET's database includes four types of tools and technology

found in most occupations that require basic digital literacy skills: personal computer (desktop or laptop), e-mail, Internet browser, and office suite (productivity) software. A personal computer is an essential tool for more than 95% of occupations. E-mail and an Internet browser are required for 52% and 51% of occupations, respectively, and 46.5% of occupations require the use of office productivity software.

The Occupational Technology Digital Literacy Skills metric examines the digital literacy of the community's residents for the specific devices and applications identified for occupational success. Respondents to the Residential Technology Survey were asked to rate their own digital literacy for the following nine devices and applications: desktop computer, laptop computer, mouse and keyboard, printers, operating system, word processing, spreadsheets, Internet browser, and e-mail; the most commonly used hardware and software in many occupations.

According to survey results, on average, residents in the Leelanau Peninsula are comfortable using the nine occupational technologies. However, upon examining the data further, there are opportunities for improvement among individual devices and applications, and within segments of various demographic groups.

While this metric examines the average digital literacy across nine occupational

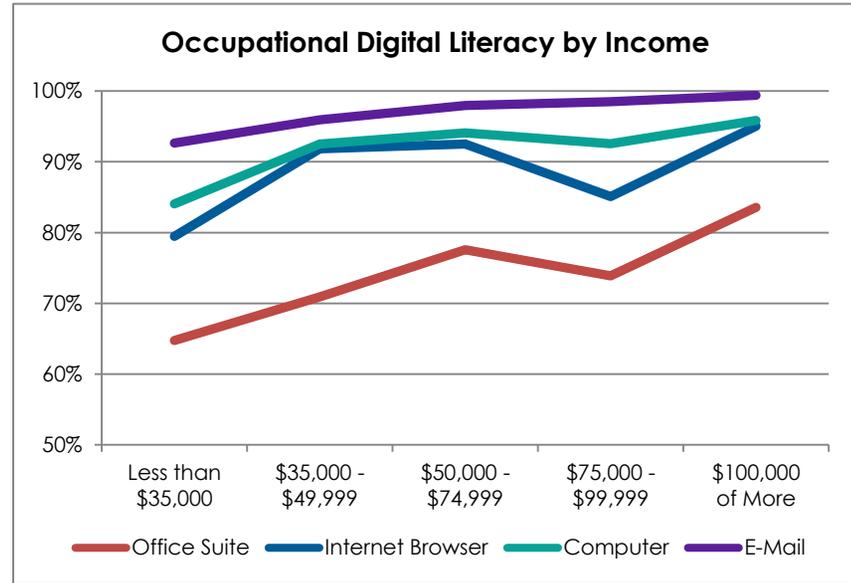


technologies, these charts examine the four most impactful literacies: office suite software (includes word processing and spreadsheets), Internet browser, computer (combines desktop and laptop computers), and e-mail. The series of charts shows the percent of respondents in each demographic category that stated, "I am very comfortable using this technology," or, "I could teach this technology to someone else," for each device or application. As shown, occupational digital literacy varies greatly within certain demographic groups.

Across all demographic groups, respondents most often exhibit a lack of knowledge about office suite, or productivity, software. This is particularly apparent among those with annual incomes less than \$35,000 and those with a high school diploma or less. For these two groups, 64.7% and 61.5%, respectively, are proficient in office productivity software, while the balance states they need to learn or know little about the application. The other occupational digital literacy items included in the charts exhibit less of a pattern within these demographic groups (with the exception of a slight upward trend as income increases).

The measurement of digital literacy among a variety of devices, applications, and activities also allows for an analysis of residents' ability to conduct an online job search.

Among all residents, approximately 75% are comfortable with or have mastered the ability to conduct an online job search. This proficiency drops to 69% among those with a high school diploma or less. For those who are unemployed and looking for work, only 50% state they are proficient in conducting an online job search.



Use/Agriculture

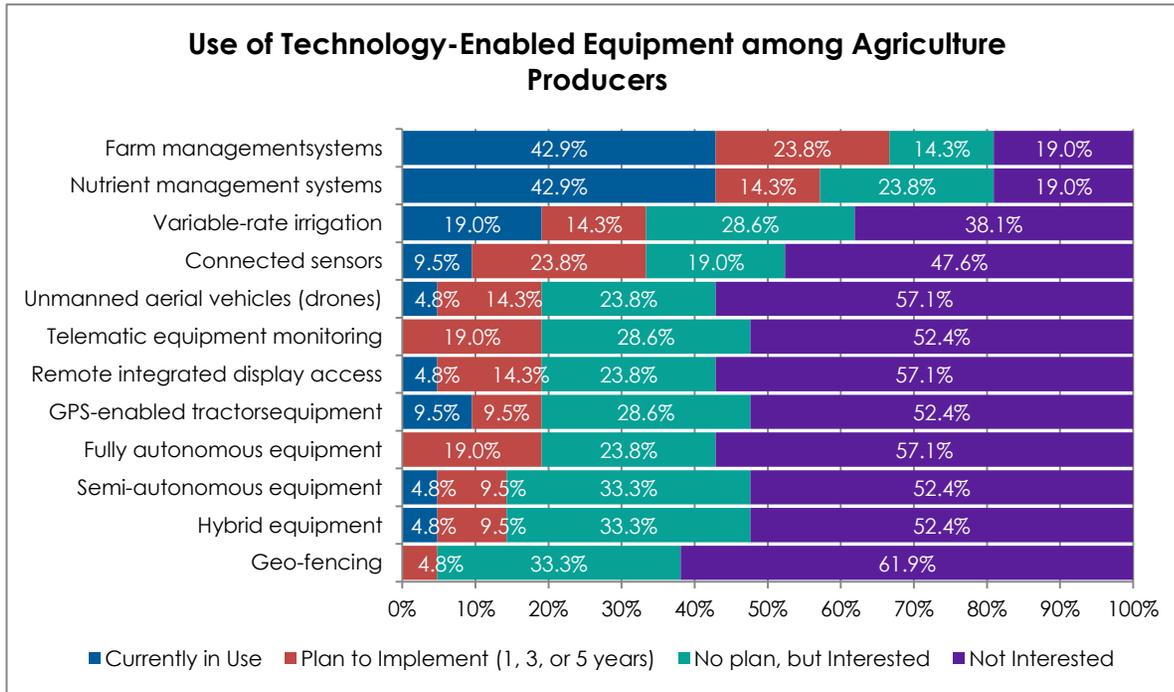
Agriculture, in its many forms, is a critical industry and economic driver for many communities and regions. The agriculture industry has experienced a technological revolution since the mid-90's, much like the transformations taking place in every sector of the economy. Internet connected technology allows agriculture producers to increase yields, reduce expenditures, and access best practices and information impacting the production of America's food. However, producers and value-added agriculture industries are generally located in the most rural areas. As has been echoed for years; rural areas are often left disconnected from the global economy do to a lack of broadband infrastructure. For those farmers fortunate enough to have an internet connection, their use of technology has transformed their operations and allows them to contribute to the economic activity of their communities.

The Agriculture Use section is comprised of six different metrics. Data for these metrics is derived from the Agriculture Survey that was distributed to agriculture producers throughout the community, as well as from the Residential Technology Survey. In the Leelanau Peninsula, survey responses were received from 27 agriculture producers in the community. Most respondents were cherry producers, but other growers are also represented including hops, general variety vegetables, apples, beef, grapes, and cut flowers.

The Agriculture Use metrics include operation adoption, operation-wide service, technology-enabled equipment, online activity, frequency of digital communication, and community awareness.

Use/Agriculture Highlights

- 56.3% Agriculture operations with internet service less than 10 Mbps
- 31.8% Producers with operation-wide internet available
- 15.5% Operations using or planning to use connected-equipment.



Operation Adoption

The Operation Adoption metric measures the number of agriculture producers in the community with internet service. Among respondents to the Agriculture Survey, 92.5% state they have dedicated internet service for their operation. The majority of producers (60%) subscribe to DSL internet over the phone lines. Fixed wireless service is also used by producers with 12% reporting such a connection. The remainder of producers use mobile broadband, cable, or satellite technology to connect.

The majority of producers (56.3%), who are aware of their internet connection download speed, report that speed is less than 10 Mbps. Additionally, most producers (66.7%) report paying less than \$75 per month for their service. Some producers (14.3%), however, pay more than \$150 per month for service.

Operation-Wide Service

Many applications and connected equipment used on the farm require access to a wireless or Wi-Fi network often in remote and rural areas. The Operation-Wide Service metric measures the presence and scale of internet access across the breadth of agricultural operations in the community.

Producers were asked, "Can the internet be accessed throughout your operation?" The majority of respondents (68.2%) indicated that the internet is not accessible in any form in the extended, more remote areas of the operation. Nearly one-quarter (22.7%) of operations indicate that Wi-Fi is accessible throughout their main operation buildings and immediate surrounding area. Finally, 9% indicate that they can access the internet via the cellular or mobile network throughout their operation.

Technology-Enabled Equipment

21st Century agriculture operations have many opportunities to use technology to improve efficiency and increase production. Specialty software and connected equipment can help realize these improvements.

Agriculture producers were asked about their current and planned use of various technology-enabled equipment. Among respondents, 15.5% say they currently use or are planning to implement the various technologies within one year. The chart shows the use and interest of the various technology-enabled equipment among agriculture producers.

The two most frequently used technologies are farm management and nutrient management systems. Nearly half (42.9%) of producers currently use these technologies. The least commonly used are hybrid equipment and vehicles and geo-fencing. If they didn't currently use or had no plan to implement the various technologies, respondents were asked to indicate if they were interested in the technology or not. The potential for improving the use of technology-enabled equipment among agricultural producers in the community lies with those saying they were interested in learning more about the technology. For example, 23.8% of respondents don't currently use or have a plan to use full autonomous equipment, but are interested in learning more about how the technology could improve their operation. Similarly, 23.8% are interested in learning more about unmanned aerial vehicles (drones).

Online Activity

While technology-enabled equipment can help improve efficiency on the farm, there are also a number of ways agriculture producers can use their internet connections to obtain the same result. An internet connection

provides unparalleled access to a host of resources and information.

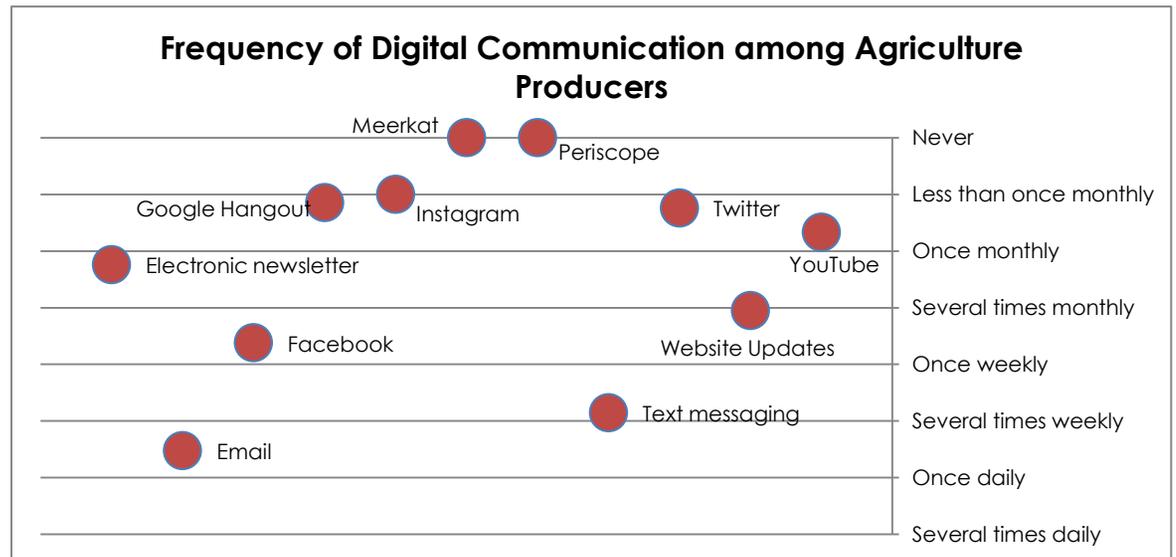
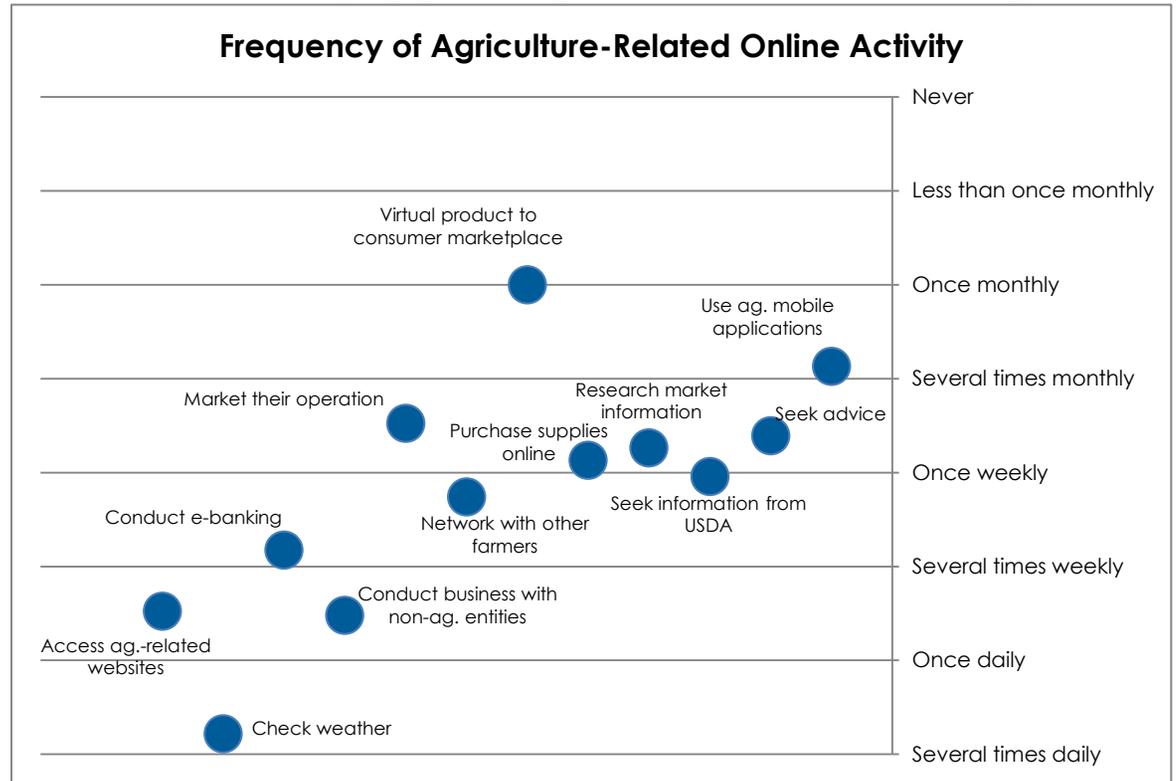
Respondents were asked to indicate how frequently they conduct various online agriculture-related activities. Among all respondents, farmers use the internet for agriculture-related activities several times per week.

The most popular activity among respondents is checking the weather forecast, a task conducted several times each day. This activity is closely followed in frequency by accessing agriculture-related websites and conducting businesses with non-agriculture businesses or entities. The least popular activity is participating in a virtual product to consumer marketplace, followed next by the use of agriculture-related mobile applications.

Frequency of Digital Communication

Technology coupled with an Internet connection provides a myriad of ways to digitally interact with the world or even those in one's own community. The Frequency of Digital Communication metric examines how often agriculture producers are leveraging digital tools and social media to inform, interact with, serve, and receive feedback from customers and the community. Survey results indicate that on, average, agriculture producers in the Leelanau Peninsula are using digital tools to communicate monthly.

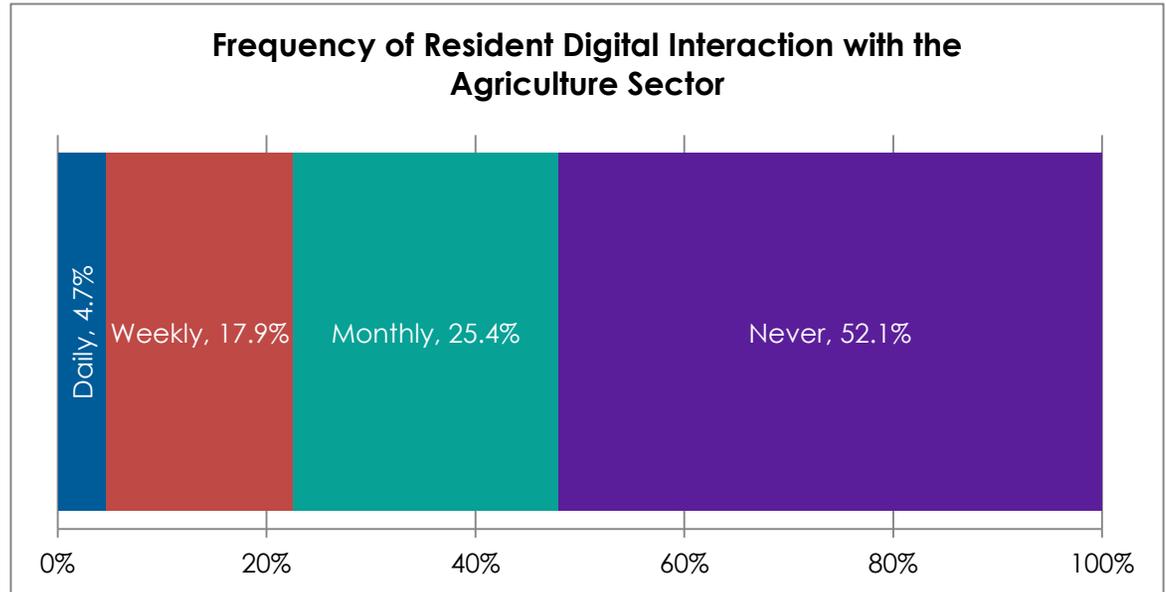
The chart shows the average frequency with which agriculture producers use various digital communications tools. Email, text messaging, and Facebook are the most popular platforms, while video-social media, Meerkat and Periscope, are never used. While Instagram and Twitter are rarely used among all respondents, those operations indicating their use do so quite frequently.



Community Awareness

The Community Awareness metric measures the frequency with which residents state they digitally interact with the agriculture sector. This metric can be thought of as the inverse of the analysis of digital communication tools used by agricultural operations. Respondents of the Residential Technology Survey were asked to indicate the regularity with which they access online information from or interact electronically with the agriculture sector. Survey results indicate that residents interact electronically with agriculture producers slightly less than once per month.

The chart provides a distribution of the various responses among survey respondents. Very few residents (22.5%) state they digitally interact with the agriculture sector at least weekly, and 52.1% say they never do so. While interaction with agriculture producers tends to be infrequent across the community as a whole, there are significant variations within various demographic groups. For example, adults aged 18 to 44 are more than three times as likely to digitally interact with the agriculture sector at least weekly than those aged 45 or more. Additionally, 23.8% of full time residents interact electronically at least weekly with agriculture, compared to just 4.2% of part-time residents. Similarly, 27.4% of households with K-12 aged children access electronic information at least weekly from the agriculture sector, compared to 18.8% of households without children.



Use/Public Safety

Police, fire, and emergency medical services, along with other supporting staff and organizations are critical to the health, safety, and wellbeing of a community. As with the other critical sectors of a community, broadband-enabled technology has changed and improved the ways in which public safety entities serve and protect. Additionally, the internet has also brought about a new wave of criminal activity known as cybercrime. From fraud to identity theft, to hacking, spam, and ransomware, cybersecurity and prevention, and the swift investigation and response to cybercrime from local, state, and federal law enforcement can help keep a community safe from virtual threats.

The Public Safety Use section is comprised of six different metrics. Data for these metrics is derived from the Public Safety Survey that was distributed to public safety agencies throughout the community. Results from the Residential Technology Survey are also used. In the Leelanau Peninsula, survey responses were received from three public safety agencies; Leelanau County Sheriff's Office, Leelanau County 911, and Leland Township Fire and Rescue.

The Leelanau County Sheriff's Office and 911 Center have a fiber-optic internet connection with a download speed between 10 Mbps and 25 Mbps. The Leland Twp. Fire and Rescue agency has a cable internet connection.

The Public Safety Use metrics include interoperable communications, next general 9-1-1, cybersecurity, website elements, frequency of digital communication, and community awareness.

Use/Public Safety Highlights



Interoperable Communications

Communication between the various public safety agencies serving a community is critical during not only day-to-day operations, but emergency situations as well. Police, fire, emergency medical services, and 9-1-1 should all be able to communicate via a single interoperable voice and data communications network.

The public safety survey reveals that the county 9-1-1 and Sherriff's office utilize an interoperable voice and data communications network. However, Leland Township Fire and Rescue indicates that they do not participate in a broader interoperable network. Additionally, both county entities use a commercial, private sector broadband network for their communications while Leland Township uses a traditional land mobile radio network.

While surveys responses were limited to these three entities, the non-participation in an interoperable network by a local public safety agency may be indicative of participation for similar agencies across the county.

Next Generation 9-1-1

Next Generation 9-1-1 (or NG911) provides public safety agencies with all new tools and techniques for protecting the health, safety, and welfare of a community. Emergency texting, streaming two-way video to the field, transmission of data-intensive files, biometric data monitoring, advanced communication with neighboring public safety agencies, and information sharing are only a few examples of how NG911 can positively impact a community. There can be a steep transition to NG911 for a community, but the benefits are many. According to the Leelanau County 911 Center, the county is currently implementing and transitioning to a Next Generation 9-1-1 system.

Cybersecurity

While the proliferation of the internet has brought about a multitude of improvements in the lives of many, it has also precipitated new forms of criminal activity. Fraud, identity theft, and hacking are just a few ways in which criminals can use the internet to take advantage of residents, businesses, and institutions. Both a strong proactive and reactive strategy to address cybercrime and staying safe online is best to keep communities safe.

The cybersecurity metric examines the ways in which law enforcement entities in the community are addressing cybercrime. The Public Safety Survey asked law enforcement agencies to identify the ways in which they address cybercrime in the community. The table lists the various methods offered in the survey.

The Leelanau County Sherriff's Office and 911 Center indicate they employ nine of the fifteen cybersecurity detection and prevention methods listed in the table.

Website Elements

A website is one of the most basic ways in which an institution establishes an online presence. Having robust, interactive, and communicative features on that website makes the user experience more efficient and impactful. The Website Use metric measures the average number of more advanced website features implemented across the websites for the community's public safety agencies. Eleven advanced website features were assessed.

The three responding agencies all have websites. The Leelanau County Sherriff's Office and 911 Center share the same website and the Leland Township Fire Department has their own web presence. The Sherriff's Office and 911 Center website employs eight of the eleven features while

| Cybersecurity Detection and Prevention | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Method | Leelanau County |
| Collaborate with Internet service providers and other private sector companies | X |
| Collaborate with non-public safety and non-industry community groups to gather and/or provide information | |
| Cooperate and share information with other agencies | X |
| Develop or participate in cyber-security and cyber-crime education sessions for the public | |
| Host cyber-security or cyber-crime educational materials on agency website and social media | |
| Identify experts already employed by agency | X |
| Participate in cyber-security or cyber-crime task force | X |
| Participate in education and training in computer forensics with local students | |
| Partner with related university or higher education resources | |
| Promote and participate in the FBI's Internet Crime Complaint Center (IC3) | X |
| Provide cyber-crime or cyber-security related alerts to the public via social media | |
| Provide training to employees on the safe use of technology | X |
| Seek and participate in training from outside experts, (e.g., National White Collar Crime Center, U.S. Secret Service, FBI, National Cyber Security Alliance, etc.) | X |
| Train all staff on the basics of cyber-security and cyber-crime | X |
| Use the FBI Regional Computer Forensics Labs | X |

the Leland Township Fire Department has implemented seven.

Neither website includes transactional functions such as bill payment, activity registration, application completion and submission, etc., nor do the websites include a stated privacy policy. The County website has a staff-friendly content management system for updates, while the township fire department site does not. Additionally, the county page has a login for staff and the township page does not. Finally, the Leland Township Fire Department page has a mechanism for providing the agency with feedback online while the county page does not.

Frequency of Digital Communication

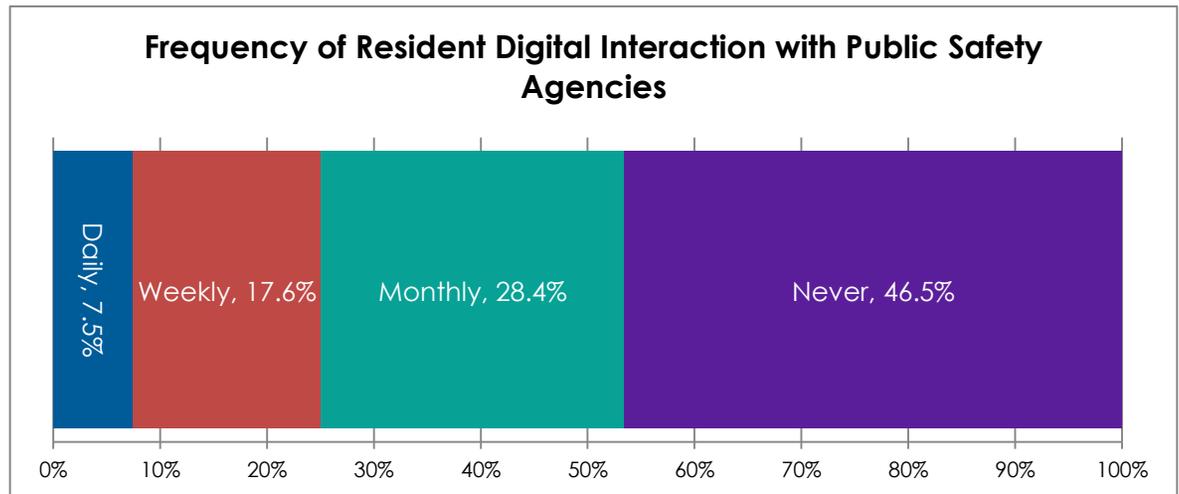
Technology coupled with an Internet connection provides a myriad of ways to digitally interact with the world or even those in one's own community. The Frequency of Digital Communication metric examines how often public safety agencies are leveraging digital tools and social media to inform, interact with, serve, and receive feedback from the community they serve. Survey results indicate that on, average, public safety agencies in the Leelanau Peninsula are using digital tools to communicate less than monthly.

Facebook and email are the most popular and most frequently used digital communication tools. The Sherriff's Office and the Leland Township Fire Department use Facebook daily. Additionally, the township fire department uses Twitter several times per day. Many of the other tools included in the survey are used infrequently or not at all. These other platforms include electronic newsletter, Google Hangouts, Instagram, Meerkat, Periscope, text messaging, website updates, and YouTube.

Community Awareness

The Community Awareness metric measures the frequency with which residents state they digitally interact with public safety agencies. This metric can be thought of as the inverse of the analysis of digital communication tools used by public safety agencies. Respondents of the Residential Technology Survey were asked to indicate the regularity with which they access online information from or interact electronically with public safety agencies. Survey results indicate that residents interact electronically with public safety agencies approximately once per month.

The chart below shows the frequencies with which residents state they interact with the public safety sector. Just over one-quarter (25.1%) of residents state they digitally interact with public safety agencies at least weekly. Households with children are more than twice as likely as households without children to digitally interact with the public safety sector.



Use/Healthcare

Access to quality healthcare is essential for quality of life in any community. From access to emergency services and family practitioners, to specialists, laboratories, and mental health services, access to healthcare provides opportunities for all to live healthy, fulfilling lives.

New healthcare technology developments offer not only new treatments and methods of diagnosis, but also greater access to healthcare providers via the internet. This is especially critical for two primary groups; 1) those living in rural communities that may not have a local presence for various specialty healthcare providers, and 2) those unable to physically visit a doctor's office due to medical conditions or other issues.

The Healthcare Use section is comprised of five different metrics. Data for these metrics is derived from the Healthcare Survey that was distributed to healthcare facilities throughout the community. Results from the Residential Technology Survey are also used. In the Leelanau Peninsula, survey responses were received from five healthcare facilities.

Three of the five responding facilities indicate they connect with a cable broadband connection with download speeds between 50 Mbps and 100 Mbps. One facility reports a DSL connection with a download speed between 3 Mbps and 10 Mbps, and the final facility reports a fiber-optic connection with a download speed between 10 Mbps and 25 Mbps. Only one facility offers free WiFi to the public.

Additionally, Munson Healthcare, the region's major healthcare provider, has stated it would like to implement a telehealth program similar to Med Now offered by Spectrum Health, in which a patient can call into a service and see a provider/physician virtually over the

internet. Unfortunately, the lack of high speed internet within homes makes this nearly impossible. This program would save patients a great deal of money as the cost to the patient is about 15% of the cost of an urgent care visit (per current Med Now figures)

The Healthcare Use metrics include technology applications, frequency of telehealth use, website elements, frequency of digital communication, and community awareness.

Use/Healthcare Highlights

2

Healthcare facilities indicating use of telehealth

50%

Healthcare facilities using electronic medical records

41.5

Average download speed for healthcare facilities

Technology Applications

Broadband-enabled technology offers a number of ways in which healthcare facilities can more efficiently treat and care for patients. An important component of technology-facilitated care is the ability to expeditiously access patient records, provide test results to patients, schedule appointments and more.

The Healthcare Survey asked respondents to indicate the current state of implementation for three applications designed to improve the interface between patients and caregivers:

- electronic medical records;
- online patient information portal (allows patients to access records, information, and schedule appointments, etc.); and
- electronic patient information capture, (allows patients to sign-in for visits, enter insurance information, etc.).

According to the survey, three of the responding healthcare facilities use electronic medical records, one plans to implement them within five years, and another has no formal plan to implement electronic medical records, but is interested in doing so.

Similarly, three facilities use an online patient portal, one has no plan to implement such an application, but is interested, and another is not interested in this technology.

Finally, only one facility uses an electronic patient capture application. Another plans to implement such an interface within one year, two have no plans to implement such an application, but are interested, and another is not interested in this technology.

Frequency of Telehealth Use

Telehealth is a collection of means and methods for enhancing healthcare public health, and health education delivery and support using telecommunications technologies. The ability to remotely access

healthcare can help improve the quality of life in rural communities that may not have physical access to state of the art facilities. Additionally, telehealth applications provide new opportunities for community residents to “age in place.” Aging in place is the ability to live in one’s own home and community safely, independently, and comfortably, regardless of age, income or ability level.

The Frequency of Telehealth Use metric examines the frequency with which the community’s healthcare facilities use or access nine different telehealth services:

- Audio-only remote patient consultations;
- Gait, seizure, and fall monitoring;
- Health and motivational coaching;
- Prompting for medication or therapy adherence;
- Provision of health information or education;
- Remote/robotic surgery;
- Remote vitals monitoring;
- Transmission of patient health history; and
- Video remote patient consultation.

Only a small number of the listed telehealth applications are used in the community. Three responding facilities indicate they do not use any of the telehealth applications. One respondent uses audio-only remote patient consultation several times each day, but does not use any other telehealth service. Finally, one facility indicates they use audio-only remote consultation (used monthly), gait, seizure, or fall monitoring (used weekly), health and motivational coaching (used monthly), prompting for therapy adherence (used monthly), and delivery of health information or education (used weekly) on a regular basis.

Website Elements

A website is one of the most basic ways in which an institution establishes an online presence. Having robust, interactive, and communicative features on that website

makes the user experience more efficient and impactful. The Website Use metric measures the average number of more advanced website features implemented across the websites for the community’s healthcare facilities. Eleven advanced website features were assessed.

An average of five of the eleven advanced website features are used among the five responding healthcare facilities in the community. While one facility indicates the implementation of all eleven advanced features, and another the use of eight, three facilities report only having two of the eleven features in place. The most commonly omitted features include transactional functions (e.g. bill payment, etc.), integration with official social media accounts, integrated search function, links to relevant organizations, login for staff/clients, etc., newsfeed for current, updates, and a privacy policy.

Frequency of Digital Communication

Technology coupled with an Internet connection provides a myriad of ways to digitally interact with the world or even those in one’s own community. The Frequency of Digital Communication metric examines how often healthcare facilities are leveraging digital tools and social media to inform, interact with, serve, and receive feedback from the community in which they operate. Survey results indicate that on, average, public safety agencies in the Leelanau Peninsula are using digital tools to communicate approximately once per month.

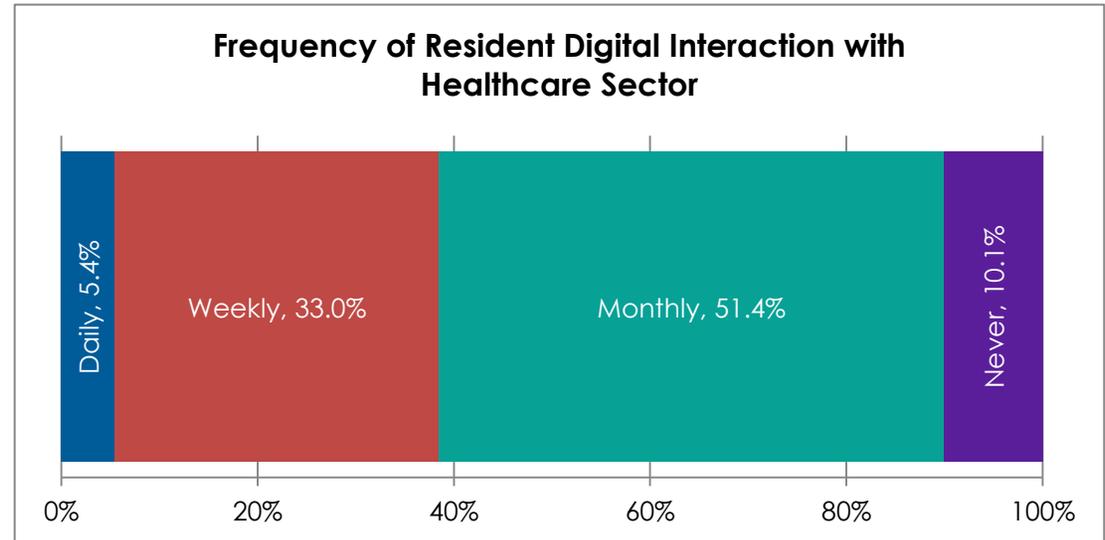
Email, Facebook, and website updates most popular and most frequently used digital communication tools. Some healthcare facilities use digital tools more frequently than others. Video-based platforms such as Meerkat, Periscope, and YouTube are never used among healthcare facilities. Twitter is

only used by one facility, and only two indicate that they use text messaging.

Community Awareness

The Community Awareness metric measures the frequency with which residents state they digitally interact with the healthcare sector. This metric can be thought of as the inverse of the analysis of digital communication tools used by healthcare facilities. Respondents of the Residential Technology Survey were asked to indicate the regularity with which they access online information from or interact electronically with the healthcare sector. Survey results indicate that residents interact electronically with public safety agencies approximately several times per month.

The chart shows the frequencies with which residents state they interact with the healthcare sector. Nearly two-fifths of residents, (38.4%), say they digitally interact at least weekly with healthcare facilities. More than half of residents (51.4%) say they do so monthly, and only 10.1% say they never electronically access the healthcare sector. Residents with higher household incomes tend to digitally interact with the healthcare sector more frequently than those with lower incomes.



CHALLENGES, STRATEGIES AND RECOMMENDATIONS

While the Leelanau Peninsula exhibits tremendous progress in broadband and technology advancement, this technology plan offers recommended actions that will help the community fill the technology gaps identified via the Connected assessment and in working with the Leelanau Peninsula broadband team. These recommended actions and/or strategies for project implementation are subject to evolution as implementers assimilate various local organizational goals and objectives.

The plan recognizes the following projects currently in various stages of implementation and supports their continuation as they help to advance the state of broadband and related technologies in the Leelanau Peninsula:

| Priority Projects |
|--------------------------------------------------------------------------------------------------------------|
| Perform an Analysis of Local Policies and Ordinances |
| Develop Public-Private Partnerships to Deploy Broadband Service |
| Complete a Vertical Assets Inventory |
| Identify, Map, and Validate Broadband Demand |
| Launch a Digital Equity Initiative - Promote Low-Cost Broadband Service Offerings for Vulnerable Populations |
| Increase Download Speeds in Libraries |

Identified Challenges

The following table identifies the broadband technology gaps and challenges in the Leelanau Peninsula identified during the assessment.

The following pages contain recommended projects with details on their implementation that address the identified challenges. Projects are divided into those addressing Access, Adoption, and Use. Use recommendations are grouped by topic, (i.e. libraries, K-12 education, government, etc.).

| Area | Challenge |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Access | Mobile broadband availability. Only 79.5% of the community's land area is covered by mobile broadband at 10 Mbps download from two or more providers. |
| | 1,960 households do not have access to broadband at 100 Mbps download. |
| | Middle mile availability could be hampering additional last-mile broadband construction. |
| Adoption | Home broadband adoption in the community is on par with the state and national average at 76.8% of households. |
| | Digital literacy, specifically with various software applications, is low. |
| Use | Low frequency of digital communication among community Organizations, libraries, economic development entities, local municipalities, travel and tourism agencies, public safety, and healthcare |
| | Website use among local businesses is low. |
| | Nearly 12% of businesses state they are interested in implementing one more advanced technology applications. |
| | Operation-wide broadband service among agricultural producers. |
| | Improve technology-enabled equipment use among agricultural operations. |
| | Implement additional methods cybersecurity prevention, education, and response. |
| | Use of advanced website features among healthcare facilities is low. |
| | Frequency of telehealth use is low. Low frequency of digital interaction between residents and the following sectors: tourism, libraries, community organizations, government, agriculture, and public safety. |

Perform an Analysis of Local Policies and Ordinances

GOAL: Ensure that local policies and ordinances are conducive to wired and wireless broadband build-out.

DESCRIPTION: High capital investment costs, including permit processing, pole attachment costs, and lack of effective planning and coordination with public authorities, negatively impact the case for deployment. For example, the FCC's National Broadband Plan concludes that, "the rates, terms, and conditions for access to rights-of-way [including pole attachments] significantly impact broadband deployment." The costs associated with obtaining permits and leasing pole attachments and rights-of-way is one of the most expensive cost functions in a service provider's plans to expand or upgrade service, especially in rural markets where the ratio of poles to households goes off the charts. Furthermore, the process is time consuming. "Make ready" work, which involves moving wires and other equipment attached to a pole to ensure proper spacing between equipment and compliance with electric and safety codes, can take months to complete.

Community and provider collaboration to problem solve around local pole attachment and other right-of-way issues is one of the most effective opportunities to encourage faster, new deployment of infrastructure.

ACTIONS:

1. Speak with providers and determine barriers they face at a local and county level.
2. Review local policies, ordinances, and other barriers to broadband deployment and consult with

- community leaders, providers, utilities, and other members of the community to ensure that they are supporting policies (local ordinances, pole attachments, rights-of-way) that are conducive to broadband build-out.
3. Develop an awareness campaign targeting local government leaders to inform them of the benefits of broadband to the entire community.

RESPONSIBLE PARTIES:

- Local units of government, particular planning and zoning officials
- Broadband providers
- County government, particular road commissions
- Utility companies and pole owners
- Others with right-of-way jurisdiction

RESOURCES:

- Guide to best practices for reducing local barriers to broadband expansion: <http://bit.ly/2d42Jcm>.
- Cutting red tape for tower construction: <http://bit.ly/2d71GG4>.

BENEFITS:

1. Lowers cost barriers to improve the business case for broadband deployment.
2. Encourages good public policy and provider relations.

Develop Public-Private Partnerships to Deploy Broadband Service

GOAL: Leverage existing community assets in partnership with private sector carriers to expand broadband network deployment.

DESCRIPTION: Public-private partnerships take many forms, limited only by the imagination

and legal framework in which the municipality operates. Some communities issue municipal bonds to fund construction of a network, which they lease to private carriers, with the lease payments covering the debt service. Others create non-profit organizations to develop networks in collaboration with private carriers or provide seed investment to jumpstart construction of networks that the private sector is unable to cost-justify on its own.

A public-private partnership should not be simply seen as a method of financing. The strength of these partnerships is that each party brings something important to the table that the other doesn't have or can't easily acquire. The community can offer infrastructure (publicly owned building rooftops, light poles, towers, and other vertical assets for mounting infrastructure) for the deployment of a network, as well as committed anchor tenants. Private-sector partners bring network-building and operations experience.

ACTIONS:

1. Determine Priorities: Competition, enhanced service, equity and service to all, public control over infrastructure, risk avoidance, redundancy, etc.
2. Examine models of partnership:
 - a. Model 1: Private Investment, Public Facilitation: Make available public assets like fiber and conduit, share geographic information systems data, streamline permitting and inspection processes, offer economic development incentives to attract private broadband investment
 - b. Model 2: Private Execution, Public Funding: Identify revenue streams that can be directed to a private

- partner, issue RFP for private turnkey execution.
- c. Model 3: Shared Investment and Risk: Evaluate using assets to attract private investment, evaluate funding new assets to attract private investment, evaluate building new fiber assets to businesses and/or homes for leasing to private ISPs.
- 3. Understand key legal considerations for localities looking to build a broadband partnership: Review authority issues, understand the legal tools and instruments that could shape the partnership, negotiate the agreement.

RESPONSIBLE PARTIES:

- Local units of government
- Broadband providers
- Community anchor institutions
- Residents and businesses

RESOURCES:

- Dept. of Commerce guide to effective public-private partnerships: <http://bit.ly/1B7L9YD>.
- Building rural broadband from the ground up: <http://bit.ly/2dx4MBw>.
- United States Department of Agriculture: <http://www.usda.gov/wps/portal/usda/usdahome>
 - o Broadband Loan Program: http://www.rurdev.usda.gov/supportdocuments/BBLoanProgramBrochure_8-11.pdf.
 - o Direct Loans: <http://www.rurdev.usda.gov/supportdocuments/Broadband%20Application%20Guide%203.14.11.pdf>
 - o Community Connect: <http://www.rurdev.usda.gov/SupportDocuments/utp2013CommConnectAppGuide.pdf>

- o Distance Learning and Telemedicine: http://www.rurdev.usda.gov/UTP_DL_T.html
- Broadband USA: Guide to Federal Funding of Broadband Projects: http://www2.ntia.doc.gov/files/broadband_fed_funding_guide.pdf
- Universal Service Rural Health Care Program – <http://www.universalservice.org/rhc/telecommunications/default.aspx>.

BENEFITS:

1. The public sector transfers much of the risk for private investment. (The public sector has many funding tools available, including incentivizing continued investment through tax credits, encouraging greater availability of private capital through government guaranteed loans, or use of government loans or grants as a direct source of capital.)
2. The partnership can aggregate demand and reduce barriers to deployment.
3. Concentrates investment on non-duplicative networks and aims to ensure that all residents have access to adequate broadband service.

Complete a Vertical Assets Inventory

GOAL: Develop a single repository of vertical assets, such as communications towers, water tanks, and other structures potentially useful for the support of deploying affordable, reliable wireless broadband in less populated rural areas or topographically challenged areas.

DESCRIPTION: Wireless communications equipment can be placed in a wide variety of

locations, but ideally, wireless providers look for locations or structures in stable conditions, with reasonably easy access to electricity and wired telecommunications, and with a significant height relative to the surrounding area. "Vertical assets" are defined as structures on which wireless broadband equipment can be mounted and positioned to broadcast a signal over as much terrain as possible. These assets include structures such as cell towers, water tanks, grain silos, and multi-story buildings.

The lack of easily accessible and readily usable information regarding the number and location of vertical assets prevents the expansion of affordable, reliable wireless broadband service. Wireless broadband providers must determine if it is worth the effort and expense to collect and analyze this data when making investment decisions. Public sector organizations are faced with the same challenges. A centralized and comprehensive vertical assets inventory can help wireless broadband providers expedite decisions regarding the deployment of affordable, reliable broadband service in rural areas.

ACTIONS:

1. Identify or develop a vertical assets inventory toolkit to provide guidelines to identify structures or land that could serve as a site for installation of wireless communications equipment.
2. Data to collect would include vertical asset type, owner type, minimum base elevation, minimum height above ground, and location.
3. Identify and map elevated structures using your community's GIS resources. The resulting database should be open-ended; localities should be encouraged to continuously map assets as they are made available.

- Disseminate information to wireless providers who may be interested in leveraging vertical assets.

RESPONSIBLE PARTIES:

- Local and county government
- Broadband providers, particularly wireless
- Residents, businesses, and institutions with vertical assets able to support wireless equipment

RESOURCES:

- Making rural broadband possible through agricultural assets: <http://bit.ly/2dpEUef>.
- 2pifi helps communities develop solutions to provide connections in hard to serve areas: <http://2pifi.com/>.

BENEFITS:

- Provides data for private and public investment decisions, lowering the initial cost of efforts needed to identify potential mounting locations for infrastructure.
- Encourages expansion of affordable, reliable wireless broadband services to underserved areas by shortening project development time.

Digital Equity – Promote Low-Cost Broadband Service Offerings for Vulnerable Populations

GOAL: Overcome the barrier to broadband adoption related to cost.

DESCRIPTION: Currently, several national and a few local providers offer special low-cost services for vulnerable populations, older adults and low-income families with children.

Furthermore, the Federal Communications Commission (FCC) is expanding its Lifeline program to allow Lifeline monthly subsidy to be applied to purchases of broadband service (as of December 2, 2016).

Administered by the FCC, the Lifeline program provides a \$9.25 per month subsidy for the purchase of voice telephone service, including mobile, and broadband (as of December 2, 2016) by low-income households. This move would make low-cost service a reality for Lifeline participants.

ACTIONS:

- Research low-cost offering in the community. Visit <http://everyoneon.org/> to find local low-cost, high-speed Internet offers by ZIP code or contact local providers listed in this plan to determine their offerings.
- Schedule community meetings (or summits) to discuss the opportunity to serve non-adopters who are experiencing a cost barrier to adoption.
- Advertise low-cost offerings via government and other community organizations websites via the digital equity initiative.

RESPONSIBLE PARTIES:

- Non-profit organizations
- Libraries and schools
- Parent-Teacher Organizations
- Broadband providers with low-cost programs
- Senior centers
- Social service providers
- Local and county government.

RESOURCES:

- Use the FCC's Cost Comparability tool to check the reasonability of local broadband prices: <http://fcc.us/2d6QBY5>.

- Universal Service Administrative Company: <http://www.lifelinesupport.org/ls/changes-to-lifeline.aspx>.
- Lifeline Program for Low-Income Consumers: <https://www.fcc.gov/general/lifeline-program-low-income-consumers>.
- Carrier-based programs Include:
 - Access from AT&T: <https://www.att.com/shop/Internet/access/#/>
 - Spectrum Internet Assist (Charter): <https://www.spectrum.com/browse/content/spectrum-internet-assist>
 - Comcast Internet Essentials: <https://www.Internetessentials.com/>

BENEFITS:

- Availability of low-cost services will help vulnerable populations overcome the cost barrier to accessing the Internet.

Library - Increase Download Speed in Libraries

GOAL: To provide adequate bandwidth for library patrons.

DESCRIPTION: The role of libraries as a community technology hub or as a facilitator of digital inclusion has never been more important.

As the ability to use a computer has become a fundamental skill that enables individuals to engage with each other and access technology applications and services, libraries must not only make sure high-speed Internet is available, but ensure they have the bandwidth to support greater user experience.

A 2014 Digital Inclusion Survey conducted by the American Library Association revealed

that the median download speeds of city libraries is 30 Mbps (wired) and 13 Mbps (Wi-Fi), while rural libraries reported medians of 9 Mbps (wired) and 6 Mbps (Wi-Fi).

With the FCC recommending a minimum speed of 100 Mbps for serving smaller communities and 1 Gbps for libraries serving populations greater than 50,000 people, Connected recommends that the community develop a pathway for advancing speeds in libraries if one is not in place.

ACTIONS:

1. Perform a technology assessment of the library system and develop a plan that includes data collected. This entails reviewing infrastructure, software, hardware, and related costs and barriers to expansion.
2. Perform speed tests during peak hours and downtown to get a better understanding of user experience at the library. To perform the speed test go to <http://www.speedtest.net/>.
3. Facilitate planning meeting with local providers to determine cost saving options while increasing speed.
4. Identify funding sources to pay for infrastructure updates and/or changes (e-Rate).
5. Incorporate technology needs in library's annual budget/plan.

RESPONSIBLE PARTIES:

- Libraries and library co-ops (if applicable)
- Schools
- Broadband providers
- Local and county governments

RESOURCES:

- Schools, Health, and Libraries Broadband Coalition report on

broadband subsidies for anchor institutions: <http://bit.ly/2dkF2qN>

BENEFITS:

Most libraries experience service degradation during peak use times, sometimes dramatically. For example, direct connection download speeds in city libraries are 69% lower during heavy usage vs. light usage periods. Increased bandwidth will help to maintain service quality for library patrons that may use the library as their only source of broadband access.

Government - Improve the Online Presence of Local Government, Implement Advanced Website Features, and Improve Civic Engagement

GOAL: Improve the functionality and accessibility of the website of local units of government in the community.

DESCRIPTION: E-government, or the use of information and communications technologies to improve the activities of the public sector, can be an effective tool for improving the delivery of services to residents and creating operational efficiencies for local governments.

Local units of government can improve civic engagement by employing digital tools aimed at involving citizens, businesses, and institutions in local decision making. The assessment of local government websites and their use of advanced features provide those municipalities with a thorough examination of their website and offers ways to improve its functionality.

Improving citizen use of local government online resources includes providing both a

reason and a means for them to interact. Advanced web features, including ways to transact and conduct business with the municipality, livestreaming of public meetings, and online surveys to gauge public opinion, are just a few ways to provide citizens with a reason to digitally interact. Various social media platforms and a robust website provide the means by which they interact.

**For communities not participating in this website assessment, the link to a free website analysis tool is located, in the resource section on the next page.*

ACTIONS:

1. Ensure local municipalities have access to this Technology Action Plan and have located the link to their custom website analysis. The Use - Government section of this assessment includes a table with the detailed scores for each local government website tested and a link to the full report generated for each site. Leadership within each municipality should have access to this report and be able to find their related information. Additionally, this section also includes a table that shows the more advanced uses present and not present on participating municipality websites.
2. Each municipality, with the assistance of their IT staff or contractor, should examine the website and the accompanying report and develop a plan for implementing recommendations and making changes.
3. Some website changes, such as implementing more advanced features as listed in the assessment, may require more advanced assistance to implement. Local web developers could help local governments implement more advanced changes.

4. If not yet completed, municipalities should develop and implement policies of various web-related activities such as website update schedules and assignments, social media updates and response to comments, etc.
5. Municipalities should examine the ways in which they digitally interact with the public including e-mail, social media, and other means. Opportunities for expansion of these efforts should be examined.
6. Finally, municipalities should implement new digital civic engagement strategies and work to build awareness for the new online tools and opportunities with the public. Public service announcements, radio spots, public access television, and newsletters can help spread the word.

RESPONSIBLE PARTIES:

- Local and county government
- Web developers and IT professionals

RESOURCES:

- Free website analysis tool: <http://bit.ly/1nZVlbG>.
- Courtland Consulting specializes in government and non-profit web development: <http://courtlandconsulting.com/>.
- Institute for Local Government Online Engagement Guide: <http://www.ca-ilg.org/online-engagement-guide>.
- Community Change Through Facebook: <http://connectmycommunity.org/project-view/community-change-through-facebook/>.
- Disaster Relief Starts Online in Michigan: <http://connectmycommunity.org/project-view/disaster-relief-starts-online-in-michigan/>

BENEFITS:

1. Improved civic engagement.
2. Greater online offering of local services.

Economic Prosperity - Host Website and Social Media Classes for Local Businesses

GOAL: Encourage small local businesses to develop websites and to use social media, e-commerce, and other advanced uses of broadband and technology.

DESCRIPTION: For small businesses, an online presence and the use of social media are vital to stay competitive in the twenty-first century. A website and social media are not just for companies that have the experience, staff, or budget; any small business can tap into these resources. Training should be provided to small businesses regarding the use of websites and social media within that small business. Website topics should range from starting a basic website to more advanced topics such as e-commerce. Social media topics should include a variety of social media outlets including Facebook, Twitter, YouTube, Pinterest, and LinkedIn.

Broadband empowers small businesses to achieve operational scale more quickly by lowering start-up costs through faster business registration and improved access to customers, suppliers, and new markets. According to Connected Nation's 2012 *Jobs and Broadband Report*, businesses that are using the Internet bring in approximately \$300,000 more in median annual revenues than their unconnected.

ACTIONS:

1. Work with the local chamber of commerce and/or the libraries to expand on existing programs that

- promote e-commerce, such as free websites and social media development, within the small businesses of the community including those involved in agriculture.
2. Partner with providers to sponsor workshops. (Providers may be willing to sponsor events since small business workshops will likely lead to increases broadband adoption and use).
3. Identify regional and community partners with resources and expertise to assist the community in producing "free" website and social media workshops.
4. Schedule workshops and advertise classes via local media.

RESPONSIBLE PARTIES:

- Chamber of commerce/economic development organization
- Libraries
- Community College
- Broadband providers
- IT/Technology organizations
- Local SCORE representatives

RESOURCES:

- The Creative Collection <http://www.thecreativecollective.com.au/social-media-training-course>
- On-Site Technology Training for Small, Rural Michigan Businesses: <http://reicenter.org/projects/completed-projects/digital/on-site-technology-training-for-small-rural-michigan-businesses-2012>.
- Importance of Tech for Small Businesses: <http://brightside.cedam.info/episodes/episode-11/>.
- Revenue Trends for Small Businesses: http://connectmycommunity.org/wp-content/uploads/2016/11/Small_Business_Infographic-FINAL.pdf
- Google Helps Businesses Get Online with Free Resources:

<http://connectmycommunity.org/project-view/google-helps-businesses-get-online-with-free-resources/>.

- Boosting Business with an Online Presence:
<http://connectmycommunity.org/project-view/boosting-business-with-an-online-presence/>.
- Building E-Commerce in Wright County, IA:
<http://connectmycommunity.org/project-view/building-e-commerce-in-wright-county-iowa/>
- Harbor Springs, MI Goes Social:
<http://connectmycommunity.org/project-view/harbor-springs-michigan-goes-social/>
- Resources for Small Business e-Commerce Development:
http://srdc.msstate.edu/ebeat/small_business.html#.

BENEFITS:

1. Provides entrepreneurial support.
2. Eliminates knowledge gap.
3. Promotes business growth and workforce development.
4. Lowers start-up costs.
5. Assists in accelerating business development.

Healthcare - Promote Telemedicine and Telehealth Applications in Remote Areas

GOAL: Deliver improved healthcare services to rural residents.

DESCRIPTION: Promote the delivery of healthcare services from a distance using video-based technologies. Telemedicine can help to address challenges associated with living in sparsely populated areas and having to travel long distances to seek medical

care—particularly for patients with chronic illnesses. It also addresses the issue of the lack of medical specialists in remote areas by awarding access to specialists in major hospitals situated in other cities, states, or countries.

While telemedicine can be delivered to patient homes, it can also be implemented in partnership with local clinics, libraries, churches, schools, or businesses that have the appropriate equipment and staff to manage it.

The most critical steps in promoting telemedicine are ensuring that patients and medical professionals have access to broadband service, understanding the main features of telemedicine, being aware of the technologies required for telemedicine, and understanding how to develop, deliver, use, and evaluate telemedicine services.

ACTIONS:

1. Use the Healthcare section of this plan to examine the ways in which local healthcare facilities are already using telehealth application.
2. Speak with or interview community healthcare providers to gather more information on the opportunities and challenges they face when working to implement telehealth services. Major challenges could include, but are not limited to, connectivity, capital costs of equipment, staff time and training on new technology/applications, etc.
3. Develop a community telehealth plan that outlines the challenges and opportunities and charts a path to overcome the challenges and works to build awareness for existing and new telehealth applications among residents.

RESPONSIBLE PARTIES:

- Healthcare providers and broadband providers
- State, county, and local government health departments
- Healthcare advocates and community organizations
- Citizens

RESOURCES:

- USAC <http://www.usac.org/rhc/>
- USDA
<http://www.rd.usda.gov/newsroom/news-release/usda-announces-funding-distance-learning-and-telemedicine-grants>
- Seven Actions Providers Can Take to Launch Telemedicine Services Successfully:
<http://www.medialogic.com/health-care-marketing/blog/7-actions-providers-can-take-to-launch-telemedicine-services-successfully/>

BENEFITS:

Telehealth, and overall improved access to healthcare, can dramatically improve the long term sustainability of a community by allowing residents to age-in-place, and provide families with the comfort that their emergency, routine, or specialty healthcare needs can be addressed quickly and locally.