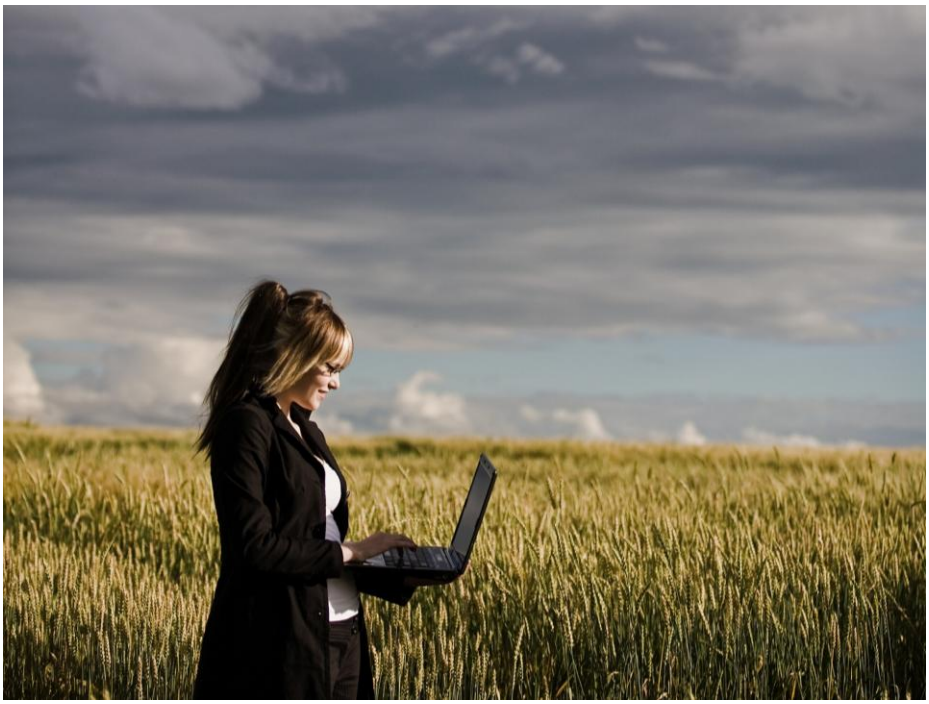
Broadband *KY*

e-Strategy Report

Utilizations and Impacts of Broadband
for Businesses, Organizations and Households



This report was prepared by Strategic Networks Group in partnership with Michael Baker Jr., Inc.

Baker

strategic networks group
the broadband economists

May 24, 2012

Prepared for:
Commonwealth of Kentucky Office of Broadband Outreach and Development

Commonwealth Office of Broadband Outreach and Development
Promoting a 21st century economy

BROADBAND KY

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This report is one of several deliverables that are part of the Kentucky Broadband Project, by the Commonwealth Office of Broadband Outreach and Development (OBOD), and managed by Michael Baker Jr., Inc. (Baker). Ongoing project reporting, outreach, field work, surveys, data analysis and development and map production incorporate information relating to the Commonwealth's Broadband availability, utilization and adoption in specific regions, including characteristics such as service provider data and coverage areas, industry and business data, and household demographics. The project derives from the American Recovery and Reinvestment Act (ARRA) of 2009; funded from the State Broadband Initiative (SBI), and administered by the National Telecommunications and Information Association (NTIA) for a five-year period from 01/01/2010 to 12/31/2014.

For certain project components, Baker contracted with Strategic Networks Group (SNG) to administer user surveys, and to tabulate, analyze and develop reports based on the collected survey data. The **Broadband KY e-Strategy Report** on the following pages was prepared by Strategic Networks Group under contract and in partnership with Michael Baker Jr. Inc.

Background, Summary and Recommendations

Many communities and regions across Kentucky face significant challenges, among them economic dislocation and an aging population. Most rural areas face the additional challenge of population shifts from rural to urban areas. In the face of these challenges, how can communities and businesses maximize their competitiveness, while improving their quality of life?

One area with significant potential is broadband (essentially high-speed Internet access), which can be leveraged into tangible benefits for communities, businesses and households. Businesses can become more productive, competitive and reach into new markets. Households can access services more easily and often more cheaply. Governments can delivery services more cost effectively.

The first step in benefiting from broadband is acquiring connectivity or access to the Internet. Once access is acquired, the second step is adoption, whereby households, businesses and other organizations begin to use their high-speed Internet access on a regular basis.

The third stage in broadband development is utilization of the Internet in increasingly productive ways that bring concrete benefits, such as job, new savings and revenues, and improved quality of life. This report focuses on utilization as the third stage of broadband development.

The benchmarking of Internet utilization in Kentucky is based on data collected in February and March 2012. This report represents an analysis of this data from a regional perspective and is intended to support regional broadband planning.

Utilizing Broadband

The ability to utilize or leverage broadband varies significantly across businesses, organizations and households. Not all businesses or households have been able to turn the potential of broadband into measurable success in terms of jobs, company attraction and retention, increased tax base and revenues, and more efficient and effective citizen services. Turning potential into reality requires skills, training, and both formal and informal support, all in addition to access to broadband availability.

In those industry sectors and communities that already have a large, diverse and modern economy and work force, building broadband infrastructure may be sufficient to realize the potential of broadband. However, many industry sectors, communities, businesses and households have limited Internet related skills and capacity. For these groups, even with state-of-the-art connectivity, leveraging broadband often lags. The consequence is that these communities (and households and businesses) lose out on many of the benefit of broadband. More importantly, over time, these communities are at risk of becoming economically uncompetitive and generally less attractive to households and businesses.

This report examines how organizations and households in Kentucky differ in their utilization of broadband and where they can look to make improvements. The report shows in detail how different industry sectors and household types compare to each other, especially between and within regions. The report provides insights and hard evidence that allow regions, businesses, and households to assess where they stand and to identify what kinds of actions will improve their performance and benefits.

The report includes recommendations for how the Commonwealth of Kentucky and its regions can improve the utilization of broadband, thereby improving their economies and quality of life. Recommendations are broken down into three areas: gaps and opportunities where regions are lagging in their use of the Internet and broadband; key barriers to improving the use and benefits of Internet and broadband; and the best ways to build skills and abilities. Analysis and recommendations are identified for both organizations (commercial and non-commercial) and households. For the purposes of this report, regional analysis has been organized into five distinct regions of Kentucky: North, Northeast, East, West, and Central. The composition of these five regions is outlined in Appendix 1.

*This report uses data collected in February through April 2012 across Kentucky. A total of 2,231 organizations and 4,122 households contributed to the broadband benchmarking effort.**

* A summary of the findings from the 2012 benchmarking effort can be found in the *Broadband KY* e-Solutions Benchmarking Technical Report (May 2012) which is largely descriptive and does not include much of the analysis nor recommendations included in this report.

The number of responses collected in this analysis is substantial, especially when compared to national polls.

Recommendations

To assist stakeholders and communities to better understand and use this report, the recommendations of the report have been structured around fundamental questions the leaders and decision-makers face in terms of leveraging broadband for the socio-economic benefit of their communities and constituents.

1. How important is high-speed Internet access to Kentucky, its communities and its residents?

In the twenty-first century, high-speed Internet access has been an essential part of a region's infrastructure, a business's internal and external operations, and a household's participation in their community life. Availability and meaningful use of high-speed Internet access speaks directly to a community's viability, competitiveness and quality of life. However, each region and community has its own unique characteristics, assets and challenges. Current Internet usage and opportunities for development vary widely, as explored in detail in the various sections of this report. This is summarized on page 14 for organizations and page 28 for households. Each region requires strategies and initiatives that address its unique situation. The Commonwealth can provide support, but social and economic developments are essentially local and regional in nature.

Over 19% of households would "definitely" relocate to another community for broadband service if it was not available to them in their current location. Another 20% would consider relocation "very likely". Broadband was also considered "essential" for selecting location by 36% of businesses and other organizations, as well as "essential" for remaining in location by 59% of organizations. **Benchmarking Data for Kentucky, May 2012.**

Recommendation #1: *Each region or groups of communities must develop its own strategy and initiatives based on its own characteristics, values and priorities.*

2. Where are the major gaps or weaknesses in utilization of the Internet?

Prioritizing industry sectors and other economic groups must be done within a regional context. While factors such as industry size within each region are considered in this report in Section 3.1.2, additional factors and considerations exist within each region, such as key industry sectors in decline or regional strategies for developing specific sectors. In general, focus should be on industry sectors that make the largest contribution to the economy and that have the greatest growth potential.

Key gaps in Internet utilization are focused on household income, age, and skill level, degree of "rurality", and organizational size and industry sector.

Recommendation #2: *Focus on high opportunity industry sectors within each region rather than undertaking broad but untargeted initiatives.*

3. How do we use the potential of the Internet to maximize job creation?

Small to medium sized organizations should be a focus for all regions. This segment, considered in Section 3.3, is important for the following reasons:

- Includes 95% of all establishments and 43% of all employment in Kentucky
- Has the lowest or weakest utilization levels compared to organizations with larger numbers of employees
- Is a dynamic engine for employment growth, especially through use of the Internet
- Has the least capacity and expertise to adopt more sophisticated and productive Internet applications

Recommendation #3: *Focus on the small-medium enterprise segment, especially 1-49 employees, to increase Internet utilization, thereby driving competitiveness, revenues and job creation.*

4. In what areas do small to medium sized business need help?

Broadband KY e-Solutions Benchmarking (eSB) identifies which types of Internet enabled applications and processes are relatively easy or hard to adopt, especially by small to medium sized organizations, as evidenced in the tables in the later part of Section 3.3. Using data on barriers to adoption, action plans can be defined at the regional level to address target groups. Note: e-solutions is the term used in this report refers to the integration of Internet technologies with the internal computer-based systems and applications within or among organizations for a variety of operational processes. e-solutions encompass not only product delivery and payment transactions (e-commerce) but also all processes that may be facilitated by computer-mediated communications over the Internet.

Recommendation #4: *Initiatives aimed at increasing utilization among the small to medium enterprise segment should focus on the following 10 utilization categories:*

1. *Delivery of services and content*
2. *Rich media or service creation*[1]
3. *Teleworking*
4. *Staff training and skills development*
5. *Advertising and promotion*
6. *Social networking*
7. *Government transactions*
8. *Customer service and support*
9. *Selling goods or services*
10. *Supplier communication and coordination*

[1] Rich media describes Web pages that use advanced technology such as streaming video, downloaded programs that interact instantly with the user for advertising.

5. How can we reach households that have not adopted the Internet or use it only minimally?

Many households that use the Internet still do not use the Internet very productively. Low utilization households are very similar to non-adopting households. They are disproportionately older and lower income. Households with low Internet adoption represent an important group due to the social and economic benefits that can be accessed through the Internet. As governments and businesses move their services to the Internet to achieve better reach and cost efficiencies, it is increasingly important that citizens have the ability to access and benefit from these online services. However, a large portion of lower income and older households have difficulty adopting and using the Internet, as described in Section 4.2. Given that low adoption and utilization is strongly tied to age and income, training should be targeted at people over 64 and households with lower incomes.

> The poorer one is and the older one is, the less likely one uses the Internet and the less productively one uses it.

Recommendation #5: *Develop training programs and resources that target households over the age of 64 or have below average incomes.*

6. Is it true that the rural areas have a particularly hard time in adopting and using the Internet?

Yes! While both urban and rural households struggle to use and benefit from the Internet, information in Sections 4.2 reveal that rural households are relatively disadvantaged, with households being generally older and having lower average incomes. Table 27 shows non-metropolitan areas with significantly lower utilization levels compared to metropolitan areas. Consequently, non-metropolitan households tend to have greater difficultly in accessing educational, health and government services, all of which are increasingly available online.

Recommendation #6**:** *Non-metropolitan areas are a priority for Internet training programs and resources.*

Rather than trying to entice target populations into existing programs (such as classroom courses), research discussed in Section 4.4 shows that Internet training initiatives should reflect the preference for both self-directed online resources, as well as existing informal networks that already have participation by these target groups. These can include seniors' centers, libraries, churches and community centers.

7. How can we help citizens of Kentucky make better use of the Internet?

Rather than trying to entice target populations into existing programs (such as classroom courses), e-solution adoption initiatives should reflect the preference for both self-directed online resources, as well as existing informal networks that already have participation by these target groups. These can include seniors' centers, libraries, churches and community centers.

The preferred learning methods of 47% of those over 65 in Kentucky are "talking to others" and "online information". The least preferred learning methods were "workshops" and "classrooms courses" (preferred by 16%).

Recommendation #7: In designing initiatives to increase and improve Internet utilization by households and organizations, considerable weight should be given to those learning methods that are preferred by the target populations.

8. How can those who do not use the Internet be assisted to start using the Internet in ways that produce tangible benefits?

Approximately one in five individuals in Kentucky does not use or benefit from the Internet. The largest group of non-Internet users are those 65 years and older. However, lower income households also have significantly lower rates of Internet adoption.

Barriers to Internet adoption vary significantly by type of household. Almost half of non-adopting older households see little value in the Internet, while generally being less skilled in use of computers and Internet. Working age individuals tend to have better computer and Internet skills, but find having Internet at home too expensive. These working age 'non-adopters" are more likely to have children at home and have at least one other person in the household who uses the Internet. These working age households are less likely to be completely isolated from the Internet. The dynamic of non-adoption of the Internet are outlined in Section 4.6.

Recommendation #8: *Broadband adoption programs should focus on those key groups that face persistent barriers to adoption, specifically elderly households and lower income households where no-one else in the household uses the Internet. Internet adoption programs should be design to address specific barriers facing their targeted group.*

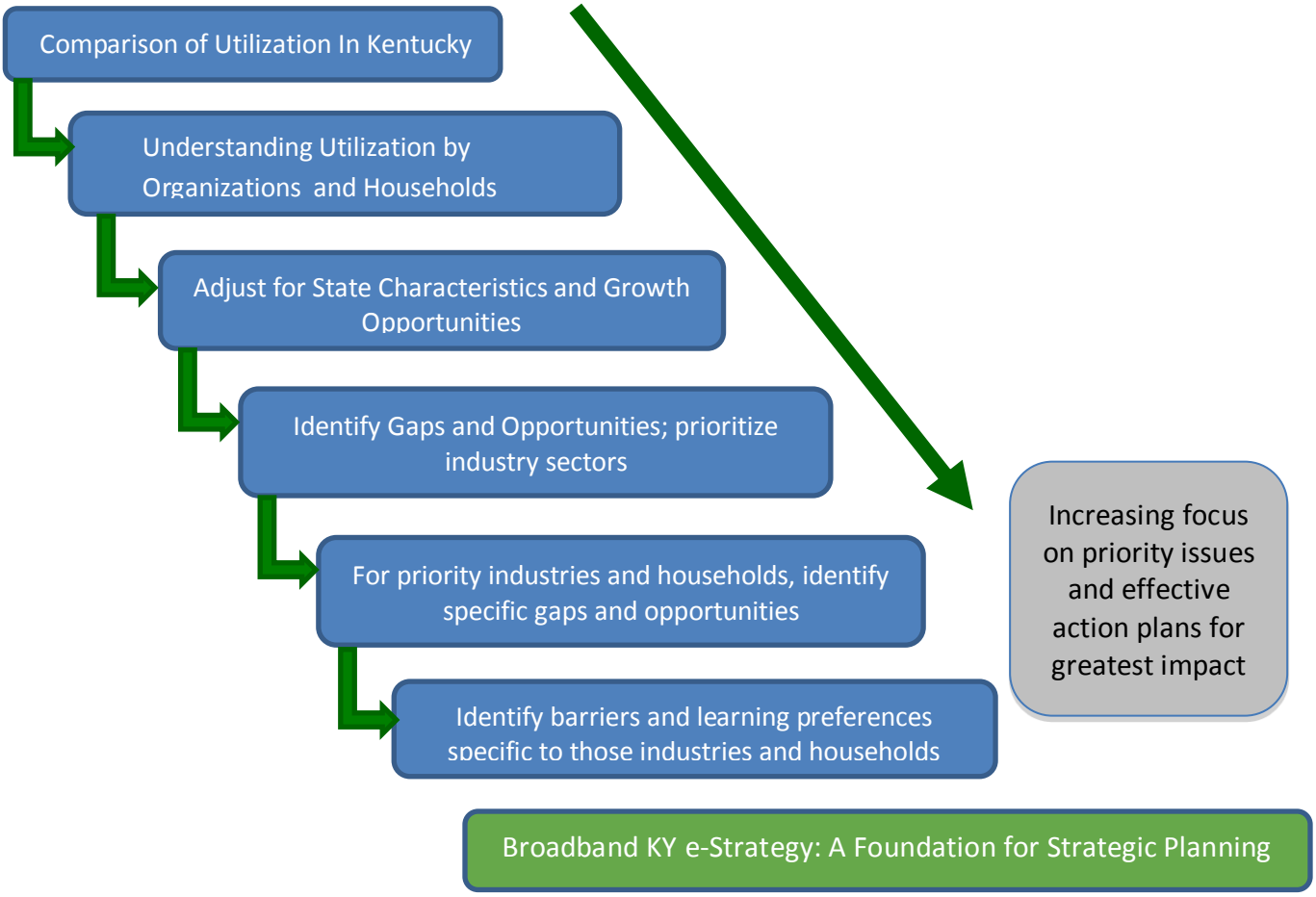
1. Starting Points

1.1 Organization and Objectives of the Report

This report is designed to be a catalyst for leveraging broadband through actionable intelligence. The chart below outlines the steps used in this report to move from descriptive data to detailed information on targets, priorities and strategies. The ultimate goal of the regional analysis of broadband in Kentucky is to:

1. Identify which segments of the regional economy utilize the Internet to a greater or lesser degree;
2. Prioritize the segments that show utilization gaps based on importance to the regional economy and opportunity to address the gaps; and,
3. Identify specific uses of the Internet that should be addressed to close the gaps, resulting in effective actions that are targeted where they will have the most impact.
4. Identify the barriers to improved Internet utilization, as well as the best means to overcome them.

Leveraging Broadband for Economic and Social Development



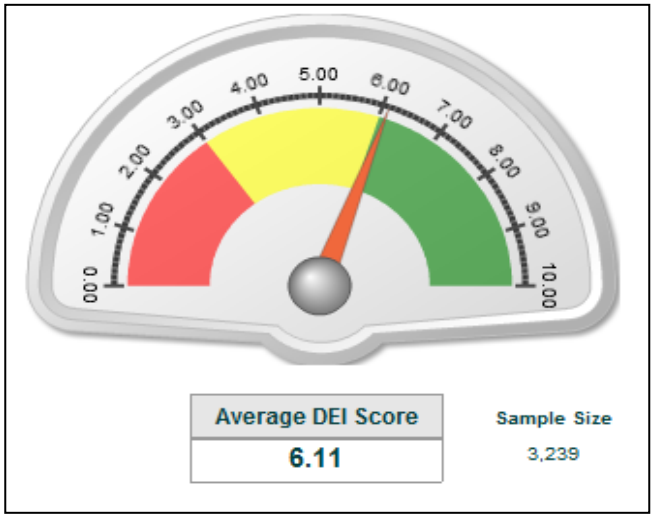
1.2 Introducing the Digital Economy index (DEi)

This report includes comparisons of Internet use between regions by various characteristics, such as industry, business size, and household demographics. To assist in the process of making comparisons, a mechanism was developed for establishing benchmarks. Benchmarks are useful in creating reference points against which the performance of any individual or group can be compared. Strategic Networks Group has developed a benchmarking process based on its Digital Economy index (DEi).

The Digital Economy index (DEi) reflects an organization's or household's utilization of a range of Internet applications and process – 17 for organizations and 30 for households. These applications and processes (e-solutions) are listed on the following pages. Based on the number of applications currently being used by an organization or household, a composite score is calculated that summarizes how comprehensively each organization or household uses Internet-enabled e-solutions. The DEi can be used to compare organizations, regions, or industry sectors. A separate DEi is used to compare how different types of households use the Internet.

An organization's or household's DEi score (from 0 to 10) captures that their utilization of e-solutions, with 10 being the highest possible use. DEi scores are averaged across groups of users by various categories: e.g. a sector's DEi is the average for all organizations in that sector. The DEi is used as a basis for comparison of utilization levels across various dimensions.

Identifying variations in DEi assists in focusing on areas where a deeper assessment is warranted. In areas where DEi is lower than average, indicating lower utilization, there is an opportunity to increase utilization and benefits to organizations and households.



DEi Meter from dashboard of the Digital Economy Analytics Platform.

The Color Coding for DEi Scores: To better show how industry sectors perform, the DEi tables in this report are color coded from the highest (**green**) to lowest (**red**) to highlight how DEi scores compare. **The color coding** (**green to red**) allows one to quickly compare groups based on how utilization varies.

Highest
2
3
4
5
6
Lowest
Insufficient Data

Different DEi comparisons can be useful for different purposes, for example:

- Individual organizations can compare their DEi score with a benchmark average DEi score for their industry in their region. This can provide insights into how well an organization is performing in terms of Internet use compared to their peers.

- Broadband planners and economic development agencies can compare DEi benchmarks between different organization characteristics, such as industries and business sizes, to gain insights into relative utilization levels to aid in targeting low utilization groups. They can also compare DEi benchmarks on a regional basis to aid in planning.
- Providers of broadband services and infrastructure can use DEi benchmarks to gain insights into where high utilization levels exist and where low utilization level need to be addressed in order to promote the greatest use from their broadband investments.

e-Solutions refer to the integration of Internet technologies with the internal computer-based systems and applications within or among organizations for a variety of operational processes. e-Solutions encompass not only product delivery and payment transactions (e-commerce) but also all processes that may be facilitated by computer-mediated communications over the Internet.

e-Solutions Categories for Households	
Communication	***Transactions***
E-mail	Buying goods or services
Voice over IP	Selling items
Online chat	Investments / trading
Sharing information	Online banking
Personal website	Paying bills
Productivity	Government services
Education or training courses	Music or video download
Accessing workplace	Software download
Teleworking	Booking travel
Home business	***Research***
Recreation	Product information
News and sports	Investments
Listen to radio	Government information
Watch TV programs	Community events
Watch movies	Education and training
Online gaming	Health information
	Travel information

e-Solutions Categories for Organizations	
e-Commerce Related	***e-Process Related***
Selling goods or services	Purchasing goods or services
Deliver services and content	Supplier communication and coordination
Rich media or service creation	Electronic document transfer
Customer service and support	Staff training and skills development
Advertising and promotion	Teleworking
Social networking	Accessing collaborative tools
Web site for organization	Banking and financial
Research by staff	Government transactions
	Access government information

2. Broadband Utilization by Organizations

2.1 How regions differ in broadband utilization

It is natural that organizations will differ in their utilization of broadband and Internet infrastructure. Research shows that productive use of the Internet and e-solutions is related to the size and density of a community or region, the types of industry sectors that make up its economy, the level of diversification of its economy, and the income, age and education of its citizens. This report explores how the make-up of the regions of Kentucky impacts their use of the Internet, as well as their ability to benefit from the potential that the Internet offers to communities, businesses and households.

At the broadest level, how do the regions of Kentucky compare in their use of the Internet? Table 1 presents the results of data collected in its simplest form. Not surprising, the North region with its diverse economy and large metropolitan base, shows the highest level of utilization of the Internet.

The only average performance of the Northeast region reflects the fact that this region is composed of two very different types of counties: one set being wealthier more urban and the other lower income. The counties of Franklin, Scott, Fayette, Woodford, Anderson, Jessamine have a median DEi of 6.7 (equal to the North region). The remaining counties in the Northeast have a median DEi score of 6.2 (being the lowest utilization area in this analysis).

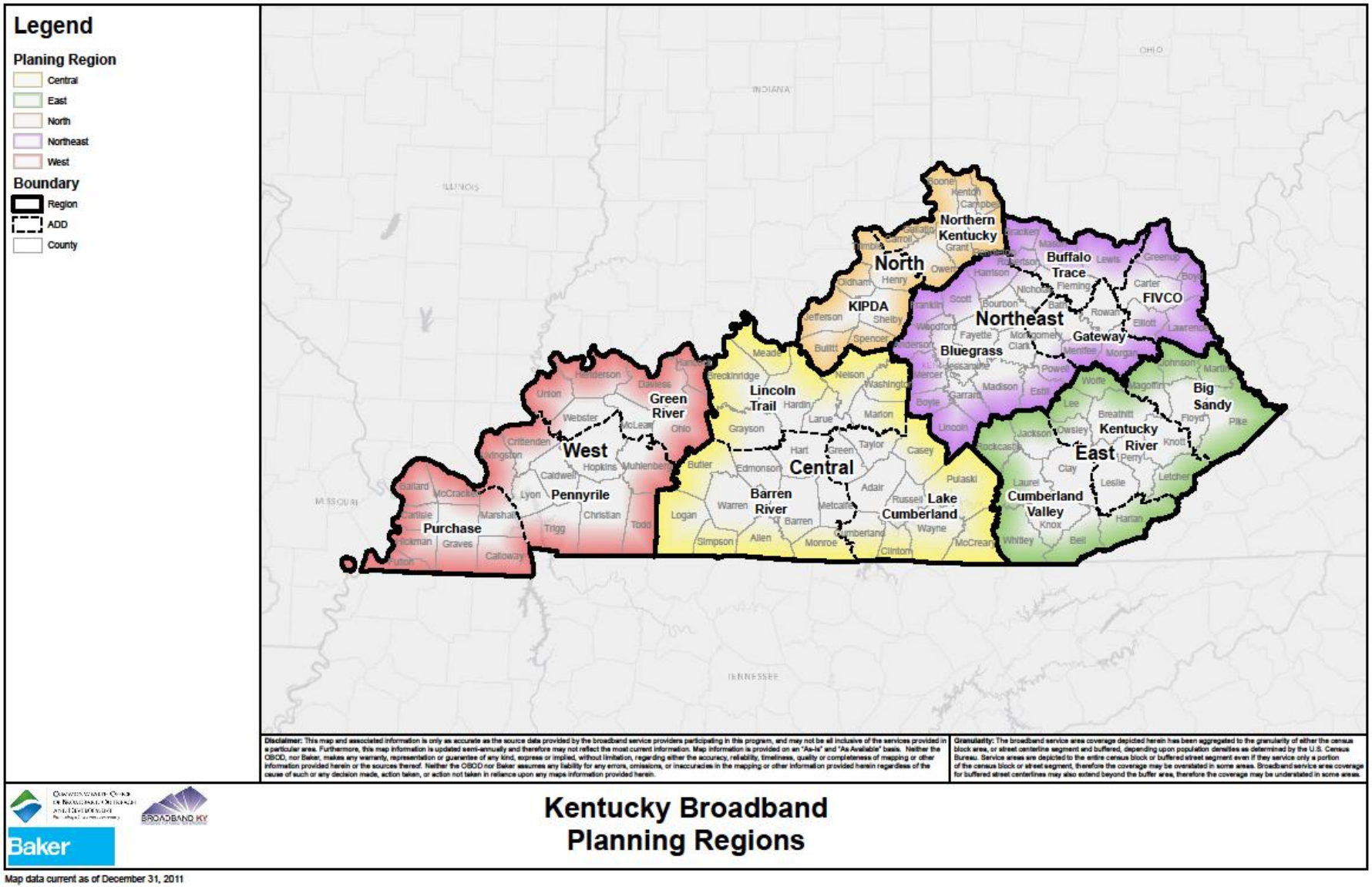
The Central region has a high median score but a low average score. This indicates that it has a disproportionate number of very low performing organizations that bring the average down below the median. In contrast, the West region has a low average score, but a middle-of-the-road median score, indicating that while most organizations have relatively low utilization, there are a number of high performers. The East exhibits a similar tendency as the West, though with lower levels of Internet use.

TABLE 1: How Regions Rank in Internet Use (Commercial and Non-commercial Organizations)

Region	Rank	Ave. DEI Score	Median DEi	Difference from Median	# Establishments
North	1	6.51	6.70	0.29	483
Central	2	6.09	6.60	0.19	443
Northeast	3	6.22	6.31	-0.10	581
West	4	6.16	6.31	-0.10	458
East	5	6.00	6.21	-0.20	279
State Average		6.22	6.41		2,244

These rankings include organizations across all industry sectors and employment sizes. To understand why the regions differ in their Internet utilization levels, it is very instructive to explore:

1. How utilization varies by industry.
2. How employment size affects utilization.
3. Which Internet applications and processes are slowest to be adopted.



Map data current as of December 31, 2011

2.1.1 Utilization by Industry

Before diving into the details of how industry sectors perform and vary, it is important to understand the make-up of the regional and state economies in Kentucky. This report uses US Census Bureau (USCB) data[2] on annual payroll to gauge the importance of industry sectors for each region. Annual payroll for an industry expresses the relative importance of an industry sector, as this represents personal income that flows into the economy and indirectly reflects levels of employment.

The following table shows the ranking of the top 8 industry sectors (excluding Public Administration) by region and statewide based on total annual payroll. The percentage of payroll, employment, and establishments represented by these top 8 industry sectors are included for reference. The top 8 industry sectors typically represent between 70% and 80% of the regional economies.

TABLE 2: Top 8 Industry Sectors by Region based on Total Payroll

Rank	Bluegrass	East	South	West	Statewide
1	Health Care & Social Assistance	Health Care & Social Assistance	Health Care & Social Assistance	Manufacturing / Processing	Health Care & Social Assistance
2	Manufacturing / Processing	Mining	Manufacturing / Processing	Health Care & Social Assistance	Manufacturing / Processing
3	Wholesale Trade	Retail Trade	Retail Trade	Retail Trade	Retail Trade
4	Finance & Insurance	Manufacturing / Processing	Construction	Construction	Wholesale Trade
5	Retail Trade	Wholesale Trade	Accommodation & food services	Wholesale Trade	Finance & Insurance
6	Professional & Technical Services	Accommodation & food services	Finance & Insurance	Transportation & Warehousing	Professional & Technical Services
7	Construction	Construction	Wholesale Trade	Finance & Insurance	Construction
8	Management of companies & enterprises	Transportation & Warehousing	Professional & Technical Services	Accommodation & food services	Accommodation & food services
% Payroll	70.6%	73.8	76.0%	76.2%	78.5%
% of Employ't	70.6%	71.0%	77.1%	76.7%	79.0%
% of Establish't	77.3%	78.8%	79.5%	77.3%	77.5%

[2] Industry data is sourced from USCB County Business Patterns for 2009.

The 2010 e-Solution Benchmarking database for Kentucky has good data sets for all industry sectors in the above table with the exception of Mining and the Management of Companies industry sectors.[3]

Internet utilization varies by industry and region. The following table summarizes the utilization (average DEi score) for each industry by region and statewide. Not surprisingly, the industry sectors with the highest utilization state-wide are the Finance, Information, and Education sectors. However, the ranking of industry sectors varies between regions. For example, the manufacturing sector is the second ranking Internet user in the Northeast.

TABLE 3: Comparison of Utilization by Region and Industry (based on Average DEi score)

Major Industry Category	Statewide	Central	East	North	Northeast	West
Finance & Insurance	7.47	7.53	7.77	7.43	7.79	7.02
Information	6.90	7.00	6.37	7.69	6.83	6.19
Educational Services	6.67	6.60	6.45	6.71	6.77	6.78
Manufacturing	6.56	6.11		6.38	7.35	6.08
Retail Trade	6.36	6.24	6.02	6.53	6.01	6.93
Other services (exc. public admin)	6.30	5.96	6.51	5.85	6.69	6.64
Professional & Technical	6.24	5.77	5.67	6.93	6.42	5.28
Wholesale Trade	6.22	6.89	4.95	6.51	5.85	5.92
Construction	5.84	5.65		6.44	6.21	5.75
Health Care & Social Assistance	5.74	5.26	5.87	5.93	5.69	5.85
Public Administration	5.17	5.36	4.47	5.71	5.19	5.10
Blank cells have insufficient data						

While the preceding table shows how different industry sectors compared to each other ***within*** a given region, another valuable way to compare Industry performance is to compare how an industry in one region compares to the same industry sector in other regions. This highlights the competitiveness and relative performance of a region and its industry sectors. As an example, the Information industry in the South has higher utilization than Information industry in the other regions. (Note: the top ranked region is rated "1" – green, with the lowest ranked region rated "5" – red).

TABLE 5: Ranking of Industry Sectors across Regions

[3] Industries are based on 2-digit NAICS code level data from USCB County Business Patterns 2009. Full names of industries from NAICS definitions are abbreviated for this table. USCB County Business Patterns data does not include Public Administration (government). It should be noted that there can be significant difference in ranking of industries based on payroll vs. employment, e.g. Retail Trade tends to rank higher in employment due to comparatively lower wage rates, whereas Finance & Insurance ranks higher in payroll compared to employment.

Major Industry	Central	East	North	Northeast	West
Finance & Insurance	3	2	4	1	5
Information	2	4	1	3	5
Educational Services	4	5	3	2	1
Manufacturing / Processing	3		2	1	4
Retail Trade	3	4	2	5	1
Other services (exc. public admin)	4	3	5	1	2
Professional & Technical	3	4	1	2	5
Wholesale Trade	1	5	2	4	3
Construction	4		1	2	3
Health Care & Social Assistance	5	2	1	4	3
Public Administration	2	5	1	3	4
Blank cells have insufficient data					

2.1.2 Variation in Utilization: Gaps and Opportunities

High variation in utilization of Internet applications and processes (referred to in this report as e-solutions) is a possible indicator of a lack of competitiveness, though it is also an indicator that these are areas with potential for improvement, given what similar organizations are doing within the same industry. In regions with poor rankings, Industry Sectors that show the highest variation in utilization compared to other regions are candidates for initiatives to increase utilization and thereby stimulate economic competitiveness and development.

TABLE 6: Industries with Significant Regional Variations in Utilization across Regions

Industry	Variation between lowest and highest DEi	Variance as % of DEi Score	Rank of Industry by Size	Average DEi	Sample Size
Wholesale Trade	1.94	31.2%	4	6.22	54
Professional & Technical Services	1.65	26.5%	6	6.24	169
Information	1.50	21.7%	13	6.9	95
Manufacturing & Processing	1.27	19.3%	2	6.56	94
Public Admin	1.24	24.0%	N/A	5.17	321
Retail Trade	0.91	14.4%	3	6.36	126
Construction	0.79	13.6%	7	5.84	102
Finance & Insurance	0.76	10.2%	5	7.47	100
Health Care & Social Assistance	0.67	11.6%	1	5.74	167
Educational Services	0.33	5.0%	16	6.67	247

In Kentucky, some of the industry sectors with the highest variation in utilization are also large sectors of the economy, indicating that these industry sectors should be priorities.

However, the process of prioritizing an industry sector also includes assessing its potential for creating new jobs and protecting existing jobs. An industry sector that is uncompetitive due to lower productivity, higher costs or less market reach is unlikely to create new jobs and is at risk of losing existing jobs. A competitive company is more likely to retain existing jobs and more likely to create new jobs, especially in an expanding industry. In this context, it is worth noting the jobs growth forecast in Kentucky for the 12 month period from the fourth quarter 2011 to fourth quarter 2012 by Moody Analytics[4]. It is important to note that these forecasts have recently been volatile and should be used with caution.

TABLE 7: Projected Employment Growth – November 2011 to November 2012

Industry	Projected Growth Rate
Construction	9.6%
Professional & Technical Services	7.8%
Leisure and Hospitality	6.2%
Education and Health	3.2%
Kentucky – All Industry Sectors	3.0%
Wholesale Trade	3.0%
Manufacturing	1.8%
Retail	1.7%
Government	0.8%
Financial Services	0.4%
Transportation & Warehousing	-0.3%
Information services	-0.8%

It should be noted that over a longer forecast period, to 2015, Manufacturing's growth is expected to be very modest, while other areas such as Education and Health, Leisure and Hospitality, and Professional and Technical Services are projected to have healthy growth rates.

Regions will benefit by closely examining the gaps and opportunities by industry sectors as part of their focused efforts to increase e-Solution utilization for each region. The following table identifies where the largest gaps in performance are, by industry and region. Areas identified as "1" have the greatest gap, followed by those identified as "2" which have smaller, but still significant gaps.

[4] See http://www.usatoday.com/money/economy/story/Jobs-Forecast-2011/34083932/1

TABLE 8: Lagging Industry Sectors: Gaps and Opportunities for Increasing Utilization by Region

Major Industry Category	Central	East	North	Northeast	West
Construction	-0.20	-1.38	0.60	0.37	-0.09
Educational Services	-0.07	-0.22	0.04	0.10	0.11
Finance & Insurance	0.06	0.30	-0.04	0.32	-0.45
Health Care & Social Assistance	-0.47	0.14	0.20	-0.04	0.11
Information	0.10	-0.53	0.79	-0.07	-0.71
Manufacturing / Processing	-0.45	1.55	-0.19	0.78	-0.48
Professional & Technical Services	-0.47	-0.57	0.69	0.18	-0.97
Public Administration	0.18	-0.70	0.54	0.01	-0.08
Retail Trade	-0.12	-0.34	0.17	-0.34	0.57
Wholesale Trade	0.67	-1.27	0.29	-0.38	-0.30
Gap 1 (0.6 or more below the state DEi)	0	3	0	0	2
Gap 2 (0.6 to 0.3 below statewide DEi)	3	3	0	2	3

Recommendation #1: Each region must develop its own strategy and initiatives based on its own characteristics, values and priorities.

In the twenty-first century, high-speed Internet access is an essential part of a region's infrastructure, a business's operations, and a household's participation in their community life. Availability and meaningful use of high-speed Internet access speaks directly to a community's viability, competitiveness and quality of life. However, each region and community has its own unique characteristics, assets and challenges. Each region requires strategies and initiatives that address its unique situation. The Commonwealth can provide supports, but social and economic development are essentially local and regional in nature.

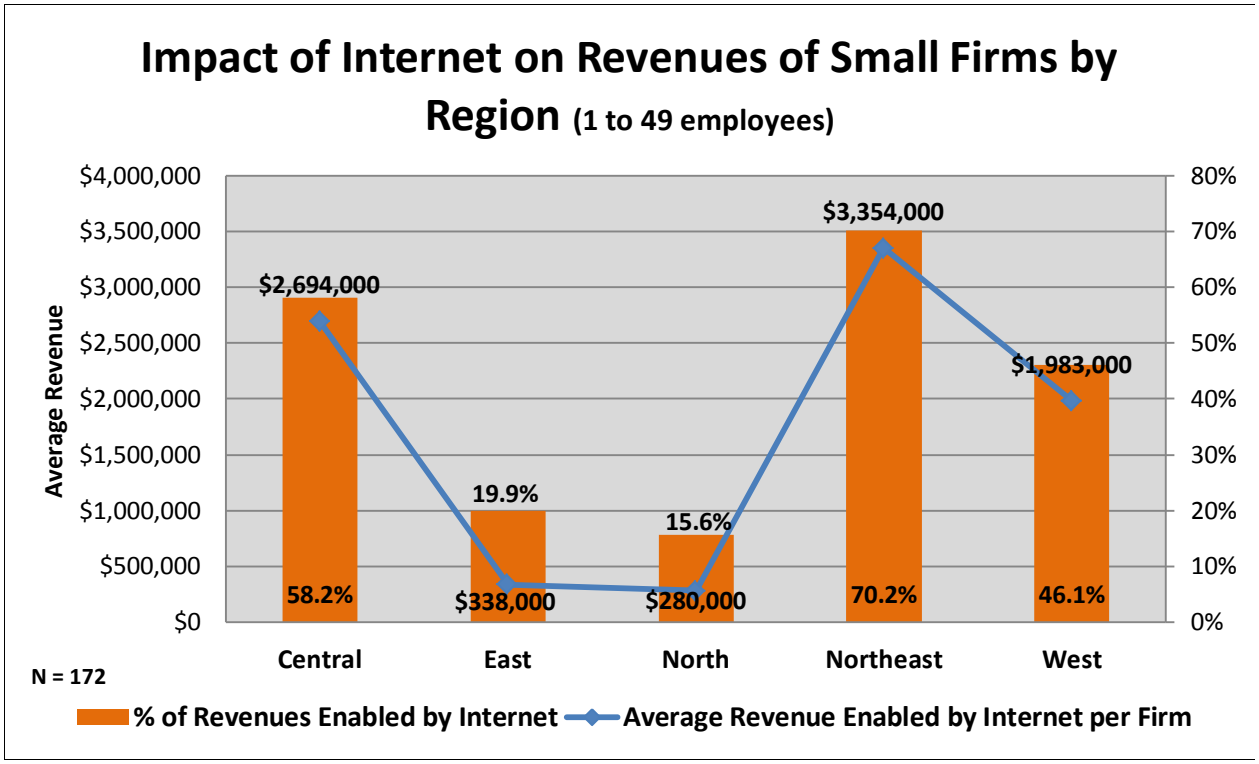
Recommendation #2: Rather than undertaking broad but untargeted initiatives, focus on industries that have the highest economic contribution and highest growth potential within each region.

Industry utilization levels vary significantly across the regions. Even lagging regions lead in some industries while leading regions lag in others. Where industry utilization lags in a region there is an opportunity to increase utilization levels and thereby increase competitiveness, revenues and job creation. The lagging industries for Internet utilization in each region are identified in this report. Setting priorities industries should also take into consideration the size and importance of each industry to the region.

2.2 How Differences in Utilization Matter

Does use of Internet applications and processes really matter? The Kentucky Benchmarking initiative provides strong support to the position that broadband connectivity, adoption and utilization has a major impact on job creation and revenue growth. Table 16 shows small to medium size organizations reporting that the Internet enabled between 15 percent and 70 percent of their revenue generation, depending on the region. It is evident that the Internet has become an integral component of the business activities of most organizations.

TABLE 16: Impact of Internet on Revenues of Small Firms by Region



Healthy revenues allow organizations to retain and hire staff, a high priority for communities and regions across Kentucky. Evidence from the Benchmarking initiative supports the position that the Internet contributes significantly to job growth, as seen in the next tables. These tables set out the number of jobs lost (1,812) and created (3,498) over the preceding 12 months by 720 reporting organizations in Kentucky. The number of net jobs created (taking into account job losses) is only half of the total jobs created. The seemingly high "churn" of job loss and creation is a natural part of a healthy economy.

What Table 18 show is that the Internet is playing a critical role in job creation, with minimal impact on job losses. The Internet plays a key role in how organizations and regions transition to the increasingly knowledge based economy. Jobs facilitated by the Internet accounted for almost one third of all new jobs. The small business sector (0 to 19 employees) was particularly effective at creating jobs through the Internet. Although this groups contained only less than 5 percent of all employment in the reporting group, this group produced 11.1 percent of all new jobs and Internet enabled jobs.

TABLE 18: Job Creation and Loss, both Generally and in Relation to the Internet

Size of Employer	# of Organizations	Current Employees	New Jobs Created	Lost Jobs	Net Jobs
0 - 19	377	2,981	467	280	187
20 - 49	141	4,495	395	259	136
50 - 99	88	5,996	424	186	238
100 - 499	85	18,899	1,088	498	590
500 or more	29	33,205	1,124	589	535
* In 12 months prior to March 2012	720	65,576	3,498	1,812	1,686

Size of Employer	New Jobs from Internet Use	Lost Jobs from Internet Use	Net Jobs from Internet Use	New Jobs from Internet Use as % of all New Jobs
0 - 19	133	16	117	28.5%
20 - 49	62	7	55	15.7%
50 - 99	111	13	98	26.2%
100 - 499	307	14	293	28.2%
500 or more	549	50	499	48.8%
* In 12 months prior to March 2012	1,162	100	1,062	33.2%

Region	Total Employees	New Jobs Created*	New Jobs Attributed to Internet	% of New Jobs Attributed to Internet*	Number of Reporting Establishments
Central	8,694	384	67	17.4%	124
East	8,308	366	90	24.6%	92
North	12,053	779	354**	45.4%	161
Northeast	24,423	928	208	22.4%	200
West	12,098	1,041	443	42.6%	143
Kentucky	65,576	3,498	1,162	33.2%	720

** 216 of these Internet related jobs were reported by a single company with over 500 employees.

Firms by Number of Employees	Share of all Jobs in Responding Organizations	Share of New Internet Jobs	Net Job Growth in Responding Firms	Net Job Growth thru Internet
0 - 19	4.5%	11.0%	6.3%	3.9%
20 - 49	6.9%	5.2%	3.0%	1.2%
50 - 99	9.1%	9.2%	4.0%	1.6%
100 - 499	28.8%	27.6%	3.1%	1.6%
500 or more	50.6%	47.0%	1.6%	1.5%
Totals	100.0%	100.0%		

* In 12 months prior to March 2012

2.3 What Contributes to the Different Levels of Utilization?

A number of factors help to explain differences in utilization between organizations and between regions.

Location of an organization in a non-metropolitan area is one such factor. Organizations outside of a metropolitan area do not benefit from the dense network of supports and skilled labor pool. Consequently, as Table 9 shows, smaller organizations located outside of a metropolitan area[5] suffer a distinct disadvantage, with resulting lower levels of utilization of e-solutions. This factor partly explains why the two least metropolitan regions of Kentucky (see Table 10) trail in Internet utilization.

TABLE 9: Impact of Location on Utilization, by Size of Organization

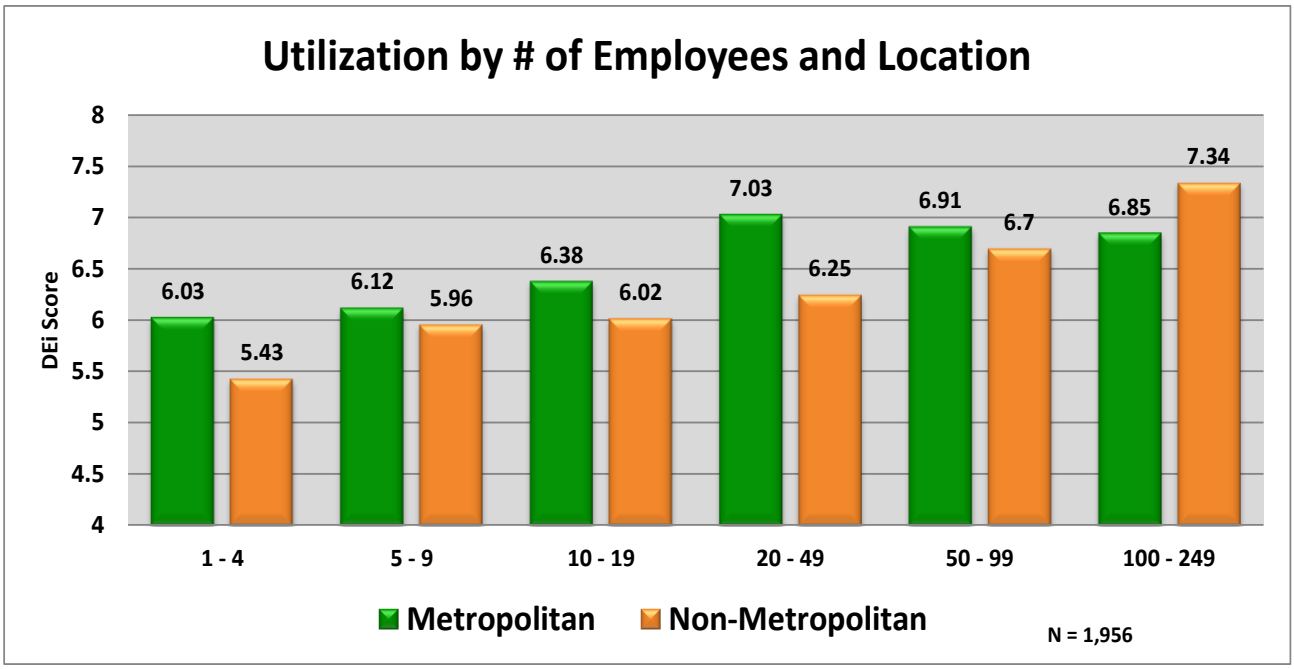


TABLE 10: Distribution of Respondent Sample by Settlement Pattern

Type of Settlement Pattern	East	West	Central	Northeast	North
Metropolitan	0.4%	20.0%	32.6%	37.2%	89.9%
Micropolitan	20.1%	37.9%	24.7%	33.4%	3.3%
Small Town	45.0%	24.1%	21.7%	22.0%	3.3%
Isolated Small Town	34.5%	18.0%	21.0%	7.4%	3.5%
	100%	100%	100%	100%	100%

[5] A metropolitan area is defined by the Census Bureau as having a core urban area of over 50,000 with a population density greater than 1,000 people per square mile. A Micropolitan area has a population of 10,000 to 49,999. A small town has a population of 2,500 to 9,999. The category of "isolated small town" includes the remainder.

Table 9 also highlights a second important factor, organizational size, with average utilization increasing for organizations with larger numbers of employees. The pattern of lower utilization by smaller firms appears related to the greater resources available to larger entities, as evidenced later in the report's section on barriers to utilization.

This importance of organizational size as a factor in e-solutions utilization is made more obvious when one realizes that almost 95 percent of establishments and 42.9 percent of employment across Kentucky falls into the 1-49 employee category, so lower utilization among this major segment provides a strong argument for making this segment a focus for promoting broadband utilization. Using data from the 2009 US Census, the following tables demonstrate the importance of smaller organizations to the regional and state economies.

TABLE 12: Number of Establishments by Employment Size Range (USCB County Business Patterns 2009)

Employment Range	East	West	Central	Northeast	North	Statewide
1 to 19	86.4%	85.9%	87.2%	85.5%	82.8%	85.0%
20 to 49	9.2%	9.1%	8.3%	9.2%	10.4%	9.5%
50 to 99	2.1%	2.7%	2.3%	3.0%	3.7%	3.0%
100 to 499	2.1%	2.1%	1.9%	2.1%	2.8%	2.3%
500 or more	0.2%	0.2%	0.3%	0.2%	0.3%	0.2%

The small to medium enterprise (SME) segment is not only a significant component of statewide and regional economies, it also tends to be a primary source of new job growth and the segment with the greatest opportunity to increase utilization levels for productivity and competitiveness (see Section 3.3).

Larger organizations in general have had access to information and communications technology (ICT) for much longer periods and have the internal resources to take advantage of these technologies, resulting in higher utilization. As such, larger organizations are less likely to be influenced by external broadband adoption and utilization initiatives and already have high utilization levels.

Recommendation #3: Focus on the small-medium enterprise segment, especially 1-19 employees, to increase Internet utilization, drive competitiveness, revenues and job creation.

Small to medium sized organizations should be a focus for all regions for the following reasons:

- Largest number of establishments (95%) and significant employment (43%)
- Lowest utilization level compared to larger employment segments
- Dynamic engines for employment growth, especially through use of the Internet
- Least capacity and expertise to adopt more sophisticated Internet applications

Where Utilization Differences Occur in SME Organizations: Some processes and applications are easier to adopt than others, such as electronic document transfer, staff research, and accessing government information. Adoption levels of these utilizations are high and there is not much variation between sophisticated and less sophisticated users.

While some smaller enterprises may not aspire to the utilization levels of large organizations and some types of utilization may be less appropriate for small organizations, it is instructive to observe where the differences lie in utilization between small and large organizations. The utilization levels of larger organizations provide potential targets for smaller organizations to achieve. Table 13 shows utilization levels of different e-solutions for small (1-19 employees), medium (20 to 99) and large (100 to 500 plus employees) organizations.

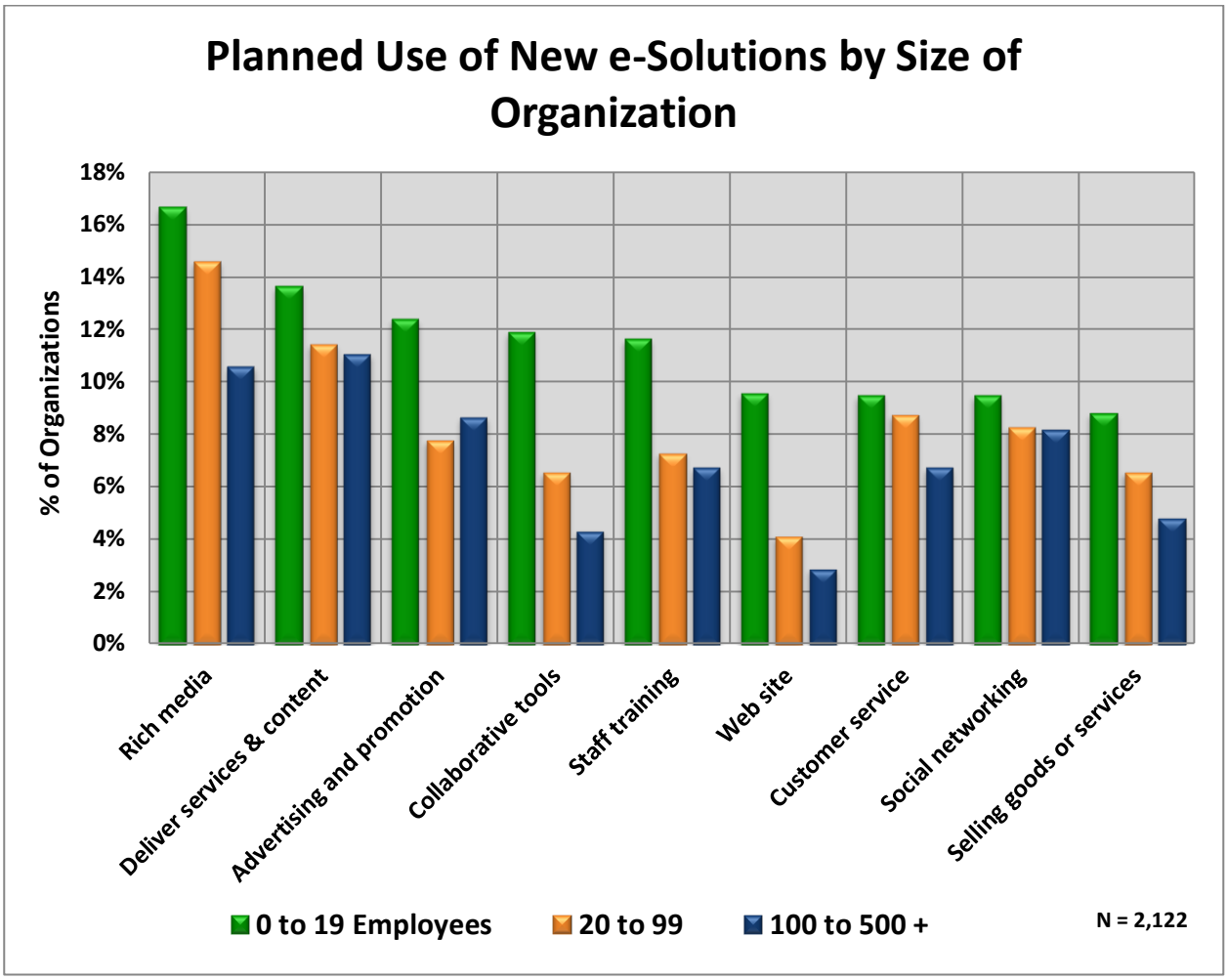
With some notable exceptions (banking, buying and selling online, and social networking), smaller organizations have lower utilization of most e-solutions than larger organizations.

TABLE 13: Variation in Specific e-Solutions by Size of Organization

Currently Used Applications and Processes	0 to 19	20 to 99	100 to 500+
Web site for organization	76.8%	89.5%	93.3%
Research by staff	83.6%	87.6%	90.4%
Electronic document transfer	81.6%	88.8%	88.0%
Access government information	81.4%	89.8%	87.5%
Staff training and skills development	65.4%	85.2%	86.5%
Accessing collaborative tools	60.0%	75.9%	86.1%
Purchasing goods or services	75.2%	74.2%	76.0%
Supplier communication and coordination	66.4%	75.9%	76.0%
Customer service and support	61.4%	64.2%	74.0%
Government transactions	61.8%	72.7%	70.7%
Rich media or service creation	41.8%	51.3%	66.8%
Social networking	62.6%	61.6%	63.5%
Teleworking	36.8%	51.8%	61.5%
Advertising and promotion	54.0%	57.4%	60.6%
Deliver services and content	36.2%	48.2%	59.6%
Banking and financial	61.2%	58.2%	48.1%
Selling goods or services	40.1%	34.8%	38.5%

While smaller organizations on average use the Internet less than larger ones, many smaller organizations are already planning to address these gaps, as seen in Table 14, which shows which e-solutions organizations were planning to adopt within the next 12 months.

TABLE 14: Planned Adoption of Specific e-Solutions by Organization Size



By combining data from the two previous tables, an assessment can be made of which opportunities offer the greatest potential for small businesses and organizations. In addition, one can see which of these opportunities are most evident to smaller businesses and organizations and which opportunities remain under appreciated. See Table 15 on the following page.

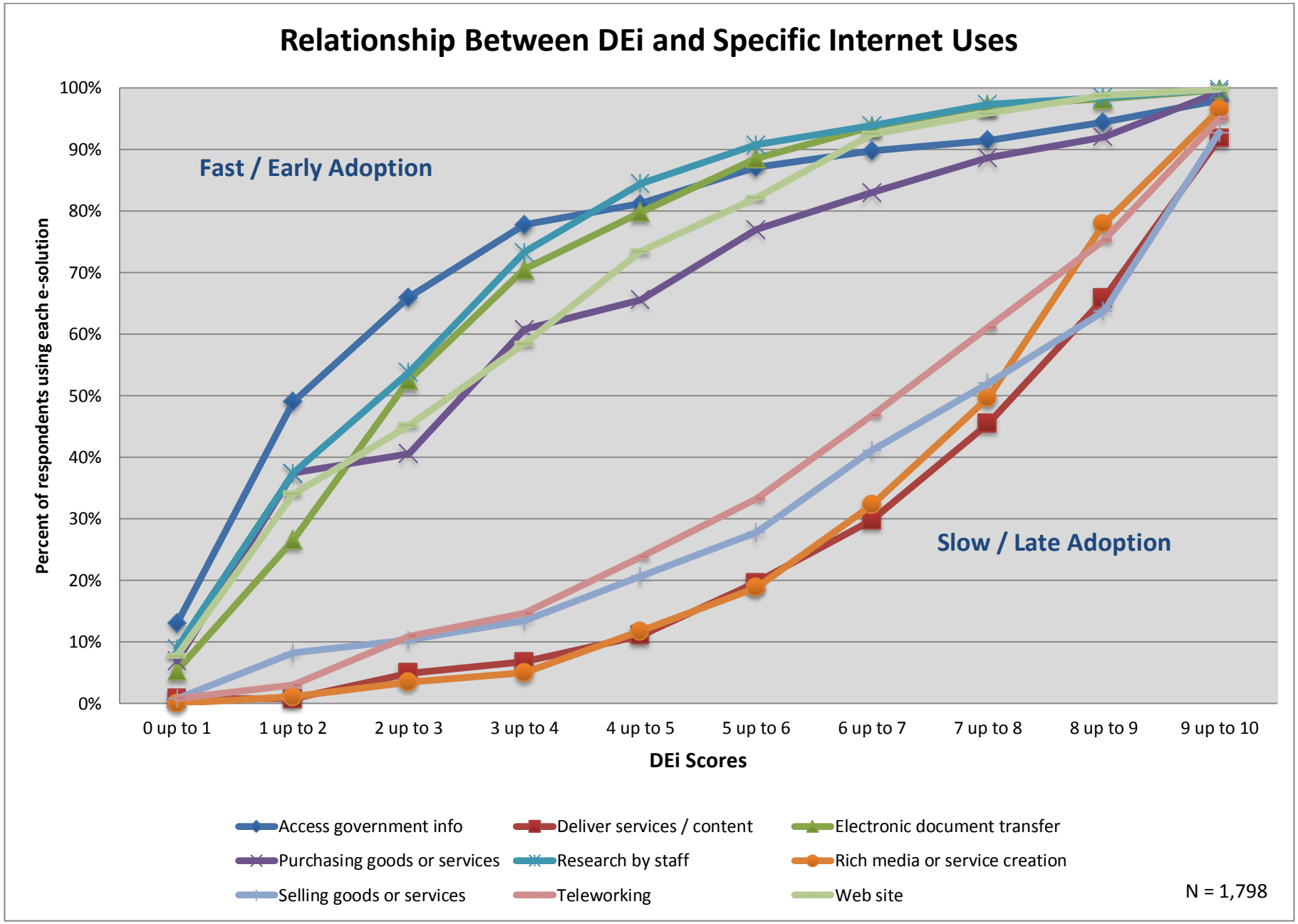
TABLE 15: Identifying e-Solutions with Greatest Variation in Utilization and Planned Use

Currently Used Processes or Applications	Variance By Organization Size*	Planned Use by Small Organizations (1 to 19 employees)
Access Collaborative Tools	26.1%	11.9%
Web site for organization	25.0%	9.6%
Rich media or service creation	25.0%	16.7%
Teleworking	24.8%	8.2%
Deliver services and content	23.4%	13.7%
Staff training and skills development	21.1%	11.7%
Banking and financial	13.1%	5.7%
Customer service and support	12.6%	9.5%
Supplier communication and coordination	9.5%	5.7%
Government transactions	8.9%	8.2%
Research by staff	6.8%	4.1%
Advertising and promotion	6.6%	12.4%
Electronic document transfer	6.4%	5.7%
Access government information	6.1%	5.7%
Social Networking	1.9%	9.5%
Purchasing goods or services	1.8%	5.4%
Selling goods or services	1.6%	8.8%

** Difference between current utilization levels by highest using group in Table 13 and the lowest using group. Italics indicates where highest using group was in the 1-19 employees range.*

Many types of utilization are more complex and sophisticated in nature making them slower to be adopted by organizations in general and by smaller organizations in particular. The chart on the next page shows the rate that each type of utilization is adopted by organizations relative to DEi scores. For example, with a state-wide average DEi of 6.41, approximately 80 to 90 percent of "average" users will be currently using the "quick to adopt" applications and processes noted below. In contrast, only 30 to 45 percent of "average" users will be currently using the "hard to adopt" e-solutions.

Quick to adopt e-solutions	Slow to adopt e-solutions
Access government information	Teleworking
Electronic document transfer	Rich media or service creation
Purchasing Goods and Services	Selling goods or services
Research by staff	Deliver services or content
Web site	


Relationship Between DEi and Specific Internet Uses
Fast / Early Adoption
Slow / Late Adoption
Percent of respondents using each e-solution
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 up to 1
1 up to 2
2 up to 3
3 up to 4
4 up to 5
5 up to 6
6 up to 7
7 up to 8
8 up to 9
9 up to 10
DEi Scores
Access government info
Deliver services / content
Electronic document transfer
Purchasing goods or services
Research by staff
Rich media or service creation
Selling goods or services
Teleworking
Web site
N = 1,798

Recommendation #4: Initiatives aimed at increasing utilization among the small to medium enterprise segment should focus on the following 10 utilization categories:

1. *Delivery of services and content*
2. *Rich media or service creation*
3. *Teleworking*
4. *Staff training and skills development*
5. *Advertising and promotion*
6. *Social networking*
7. *Government transactions*
8. *Customer service and support*
9. *Selling goods or services*
10. *Supplier communication and coordination*

Once industries and segments are targeted for each region, the specific utilization categories that represent gaps and opportunities should be targeted.

2.4 Barriers to Improved Utilization

So we now know which industry sectors in which regions have the greatest gaps in Internet utilization. As well, we have additional information needed to prioritize industry sectors, such as impact of size of organization and impact of sector on utilization. We also know in which specific areas (applications and processes) these industry sectors and priority groups are lagging. Lastly, evidence has been presented on the importance of the Internet to the competitiveness and health of regional economic development, including achievement of such objectives as job creation.

Before a plan can be designed to support these priority groups it is important to understand the barriers to adoption of e-solutions. The following table identifies the importance of a range of factors in inhibiting the adoption and use of e-solutions by organizations.

TABLE 19: Barriers to Adoption of e-Solutions – Regional Comparison to Statewide Averages

Barrier to using e-Solutions: Very Important	All organizations	Organizations with 1 - 49 employees				
	Statewide	Central	East	North	Northeast	West
Privacy concerns	71.4%	70.2%	71.4%	74.6%	70.6%	75.2%
Available Internet is too slow	59.2%	58.8%	61.5%	62.9%	56.4%	59.5%
Lack of internal expertise and knowledge	45.8%	45.6%	50.9%	48.8%	46.8%	46.0%
Loss of personal contact with clients	45.1%	45.6%	49.1%	49.5%	43.6%	47.1%
High cost of development/maintenance	45.8%	44.1%	52.2%	47.4%	45.3%	46.0%
Suppliers not ready	41.5%	39.7%	42.9%	41.6%	44.8%	42.0%
Security concerns	30.2%	29.0%	30.4%	30.2%	32.8%	33.2%
Uncertain about benefits	28.7%	26.1%	30.4%	29.2%	29.9%	35.0%
Products not suited to Internet sales	24.9%	29.0%	19.9%	29.2%	23.3%	26.3%
Internal organization resistance	24.3%	23.9%	24.2%	28.2%	21.2%	26.3%
*Color coding highlights where regional variance from state average is 5 percentage points or higher						

A key finding is that the importance of barriers varies to only a limited extent from region to region.
The **top 5 barriers** that are important factors for more than 45 percent of organizations are:

1. Privacy concerns
2. Available Internet is too slow (though virtually all of respondents have some form of broadband)
3. Lack of internal expertise and knowledge
4. Loss of personal contact with clients
5. High cost of development / maintenance

3. Households

3.1 Overview

It is not only Internet utilization by businesses and other organizations that varies across regions. Utilization by households varies as well. This has implications for delivery of government services, self-employment, and access to a range of Internet based services, both commercial and non-commercial. So, to what degree are there differences in household utilization of the Internet across Kentucky? As the following table shows, the North and Northeast regions have a distinctly higher level of utilization compared to the other three regions. However, once again the Northeast region includes a notable internal variation between the wealthier counties (Anderson, Fayette, Franklin, Scott, Jessamine, and Woodford) which have a DEi of 6.67 (well above the state average) and other counties in the Northeast which have a DEi of 5.99.

TABLE 20: Household Utilization (DEi) by Region

Region	Rank	Average DEi Score	Diff. from Average	# Households
North	1	6.31	0.21	695
Northeast	2	6.29	0.19	1,207
Central	3	5.95	-0.15	735
West	4	5.93	-0.17	1,030
East	5	5.92	-0.18	455
Kentucky		6.1		4,122

3.2 Explaining Differences in Household Utilization

Some of the variation in household utilization is a result of factors that impact all regions. These important factors include household income and age. The following chart shows the cumulative impact of age and income on utilization as expressed by DEi scores.

Addressing expertise and knowledge related to e-solutions can mitigate other barriers, especially privacy concerns.

TABLE 21: Household Utilization (DEi) by Age and Income

Respondent Age	Household Income: Less than $30,000	$30,000 to $49,999	$50,000 to $100,000	More than $100,000	Overall
18 to 34 years	5.9	6.7	7.1	7.3	6.5
35 to 54 years	5.6	6.1	6.7	7.1	6.3
55 to 64 years	4.9	5.4	6.0	6.3	5.7
65 years and over	4.8	4.4	5.5	6.1	5.2
Overall	5.5	5.9	6.5	6.8	

The trend of increasing utilization with increasing household income is consistent for all regions. Similarly, the trend for decreasing utilization over the age of 55 is consistent for all regions.

TABLE 22: Utilization by Median Household Income by Region

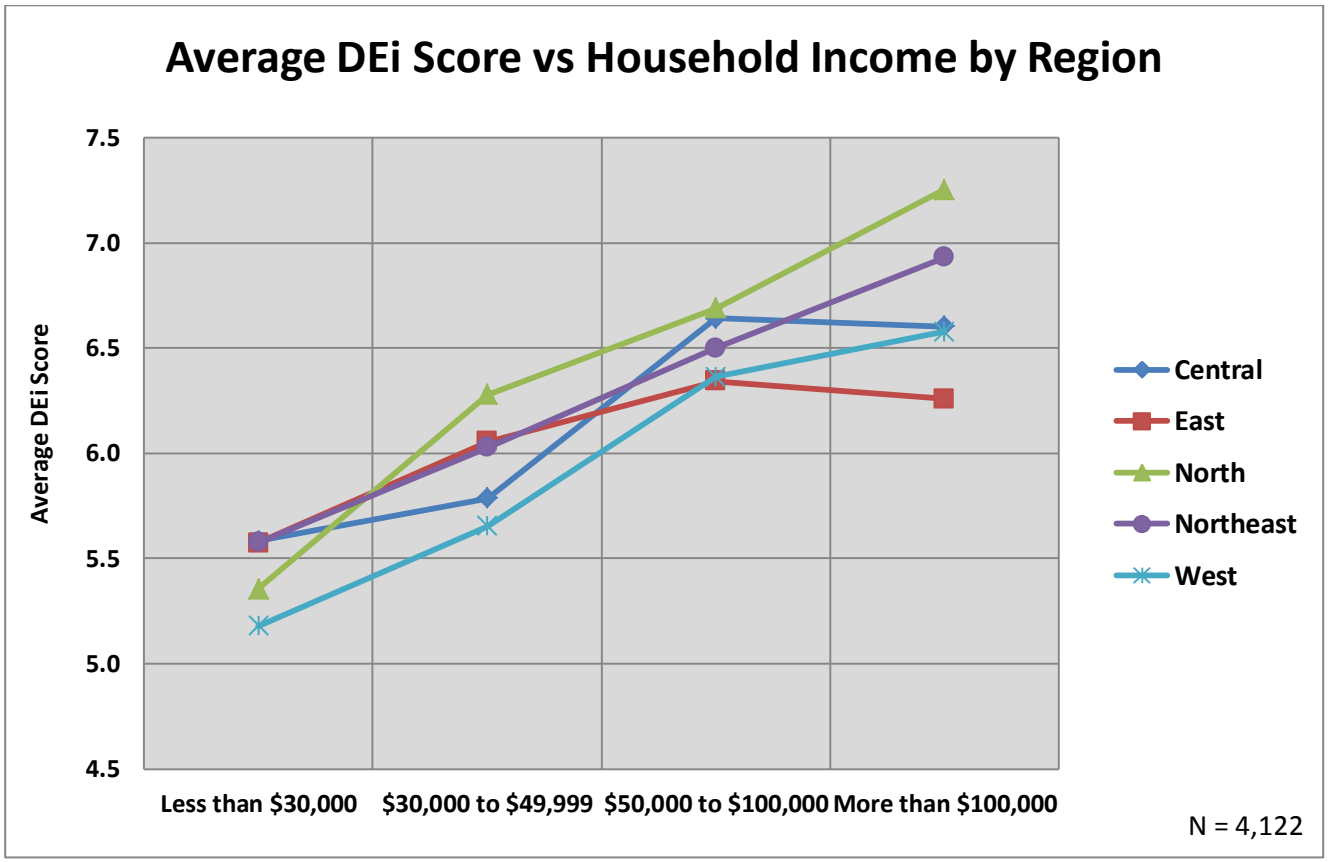
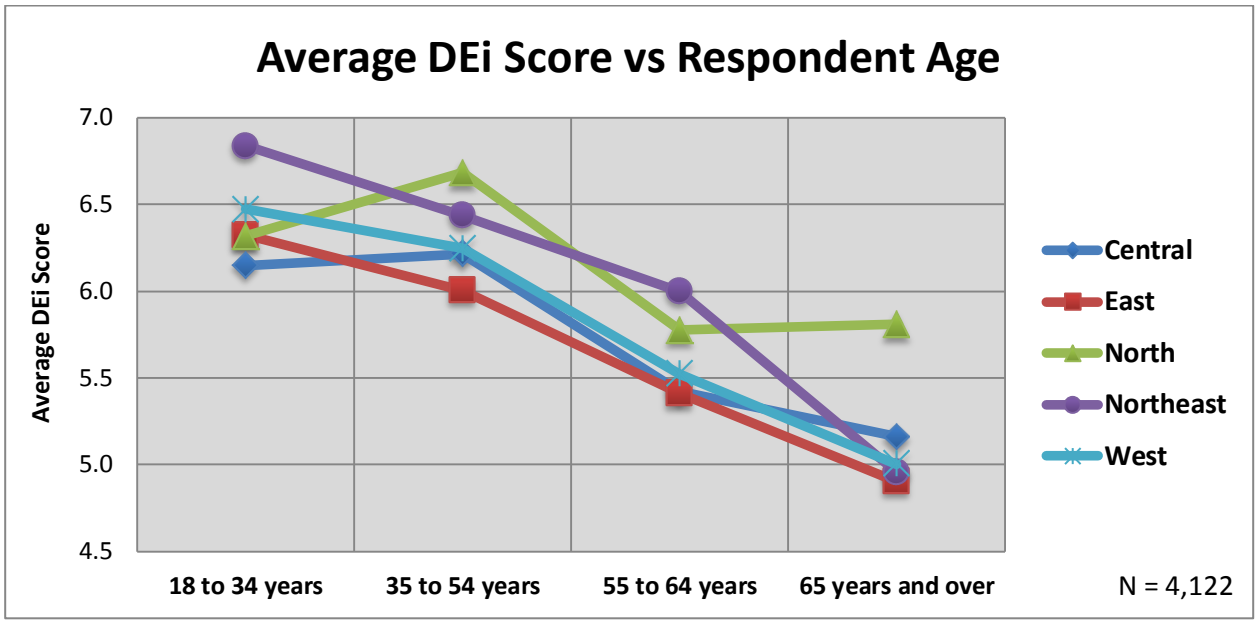


TABLE 23: Utilization by Age by Region



Given the impact of age on utilization, it is useful to acknowledge the different age and income profiles of the four regions. The North region stands out as having a significantly higher median income than the other four regions. The Northeast contains the split between higher and lower income counties. The East has by far the lowest median income of the five regions, which is probably a major contributor to its low DEi score.

TABLE 24: Household Income and Age by Region

Region	Median Household Income	Median Age (2009)
Central	$36,941	38.0
East	$28,721	38.7
North	$49,128	37.3
Northeast	$42,067	36.7
West	$39,030	38.6

	Population Distribution						
Region	**Total**	**Pct. Pop.**	**Under 18**	**18 - 34**	**35 - 49**	**50 - 64**	**65 & over**
Central	760,568	17.2%	182,495	168,582	155,471	148,681	105,339
East	505,473	11.4%	115,057	106,464	107,481	106,755	69,716
North	1,397,738	31.6%	340,660	312,548	297,158	275,137	172,235
Northeast	1,046,418	23.7%	237,611	254,514	217,937	202,097	134,259
West	629,170	14.2%	147,548	136,909	122,257	125,778	96,678
State	**4,339,367**	98%	**1,023,371**	**979,017**	**900,304**	**858,448**	**578,227**

	Population Share by Age Group				
Region	**Under 18**	**18 - 34**	**35 - 49**	**50 - 64**	**65 & over**
Central	24.0%	22.2%	20.4%	19.5%	13.9%
East	22.8%	21.1%	21.3%	21.1%	13.8%
North	24.4%	22.4%	21.3%	19.7%	12.3%
Northeast	22.7%	24.3%	20.8%	19.3%	12.8%
West	23.5%	21.8%	19.4%	20.0%	15.4%
State	**23.6%**	**22.6%**	**20.7%**	**19.8%**	**13.3%**

Computer skills are also an important factor that directly affects levels of utilization, with lower computer skill levels reflected in lower utilization consistently across all regions. Computer skill levels vary to a limited degree by region, with the North region having the highest incidence of expert users. Results for the North region can be partly explained by the higher income levels and younger average population.

A more significant factor is the not unexpected relationship between age and computer skill, with individuals 55 and older having noticeably lower skill levels. To maximize the benefits of broadband, it is important to address the improvement of computer and Internet skills among key population groups.

TABLE 25: Computer Skills by Age

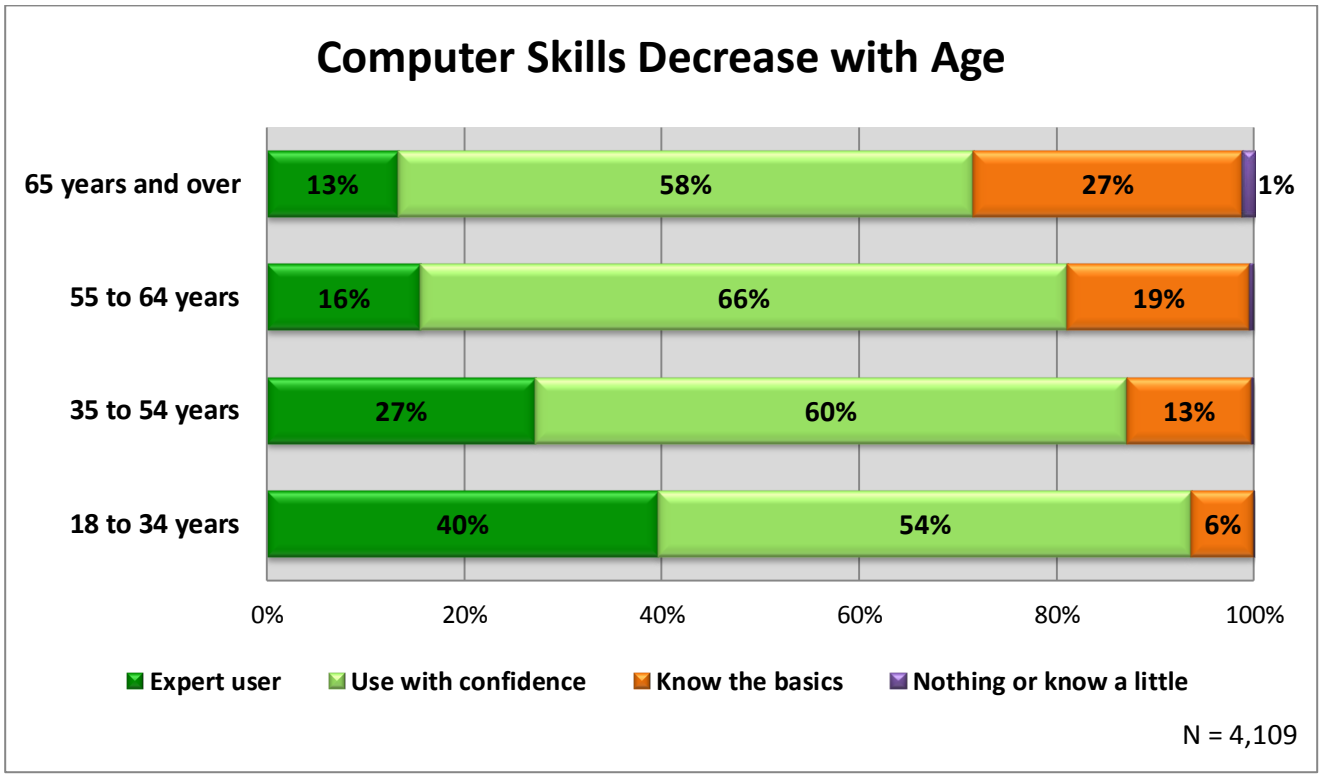
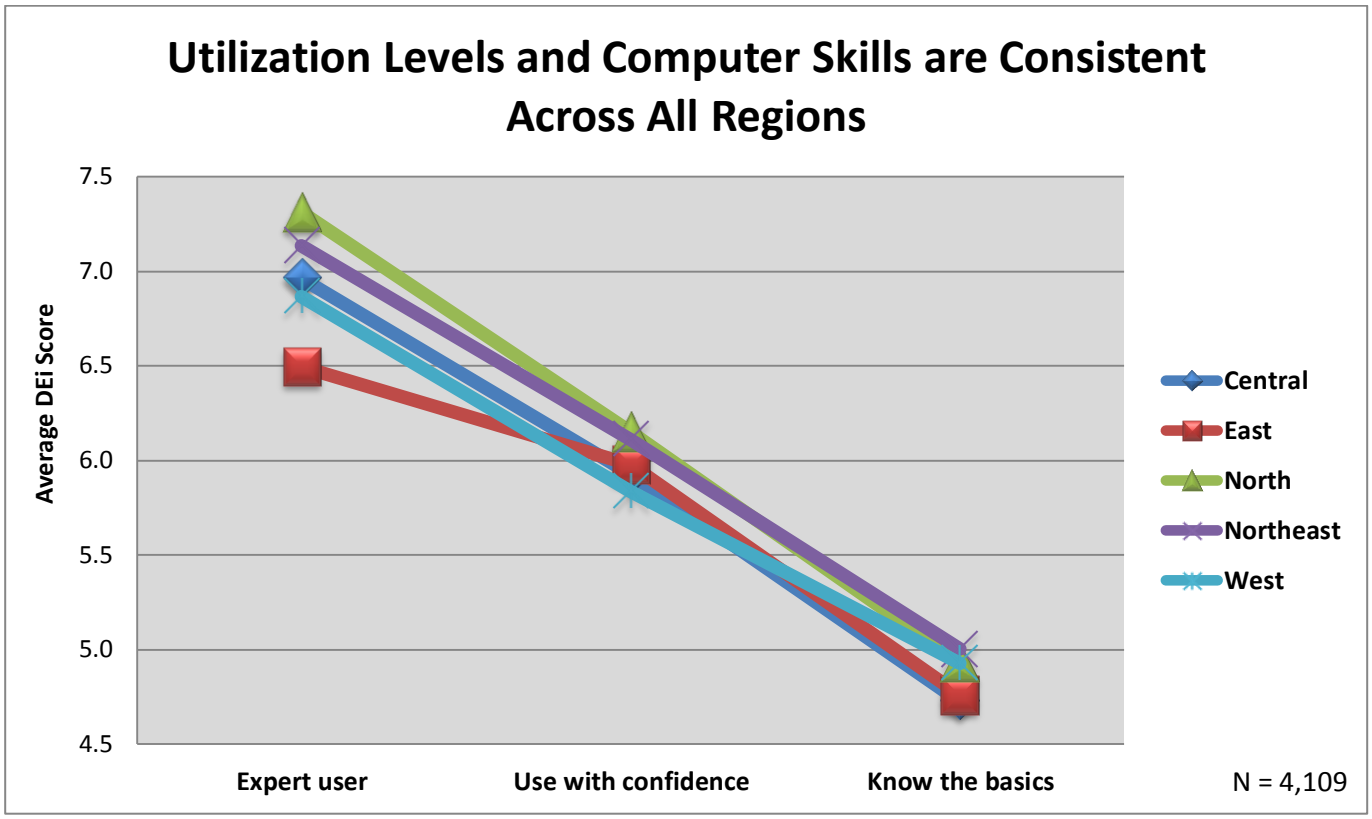


TABLE 26: Utilization (DEi) and Computer Skills by Region



Recommendation #5: Develop training programs and resources that target lower to middle income households over the age of 64.

Households with low computer skills represent an important group due to the social and economic benefits that can be accessed through the Internet. As governments and businesses move their services to the Internet to achieve better reach and cost efficiencies, it is critical that citizens have the ability to access and benefit from these online services. However, a large portion of lower income and older households have difficulty adopting and using the Internet. Given that low adoption and utilization is strongly tied to age and income, training should be targeted at people over 64 with low to moderate income.

Location Matters: Similar to organizations, household use of e-solutions is impacted by whether a household lives in a metropolitan area[6] or not. The following table shows metropolitan (essentially urban) households to have, on average, markedly higher utilization of e-solutions.

TABLE 27: Rural - Urban Household Utilization for All Types of Connectivity

Rural-Urban Category	Ave. DEi Score	# Households
Metropolitan	6.34	1,527
Micropolitan	6.11	941
Small Town	5.96	941
Isolated Small Town	5.77	700

Dial-Up Hurts Utilization: Not surprisingly, households with dial-up Internet connections also have very much lower levels of utilization, with an average DEi of 3.17 compared to households with broadband who have an average DEi of 6.26. Even within the group of dial-up users, urban households showed higher levels of e-solution utilization, though more importantly, isolated small town households are almost four times as likely to have dial-up compared to their metropolitan neighbors.

TABLE 28: Rural - Urban Utilization for Dial-up Households

Rural-Urban Category	Ave. DEi Score	# Households	Dial-up Households as % of Category
Metropolitan	3.63	30	2.1%
Micropolitan	2.82	48	5.4%
Small Town	3.12	50	5.7%
Isolated Small Town	3.20	51	8.0%

Recommendation #6: Non-metropolitan areas are a priority for Internet training programs and resources.

While both urban and rural households struggle to use and benefit from the Internet, rural households are relatively disadvantaged, being generally older and having lower average incomes. Lastly, rural households tend to have greater difficultly in accessing educational, health and government services, all of which are increasingly available online.

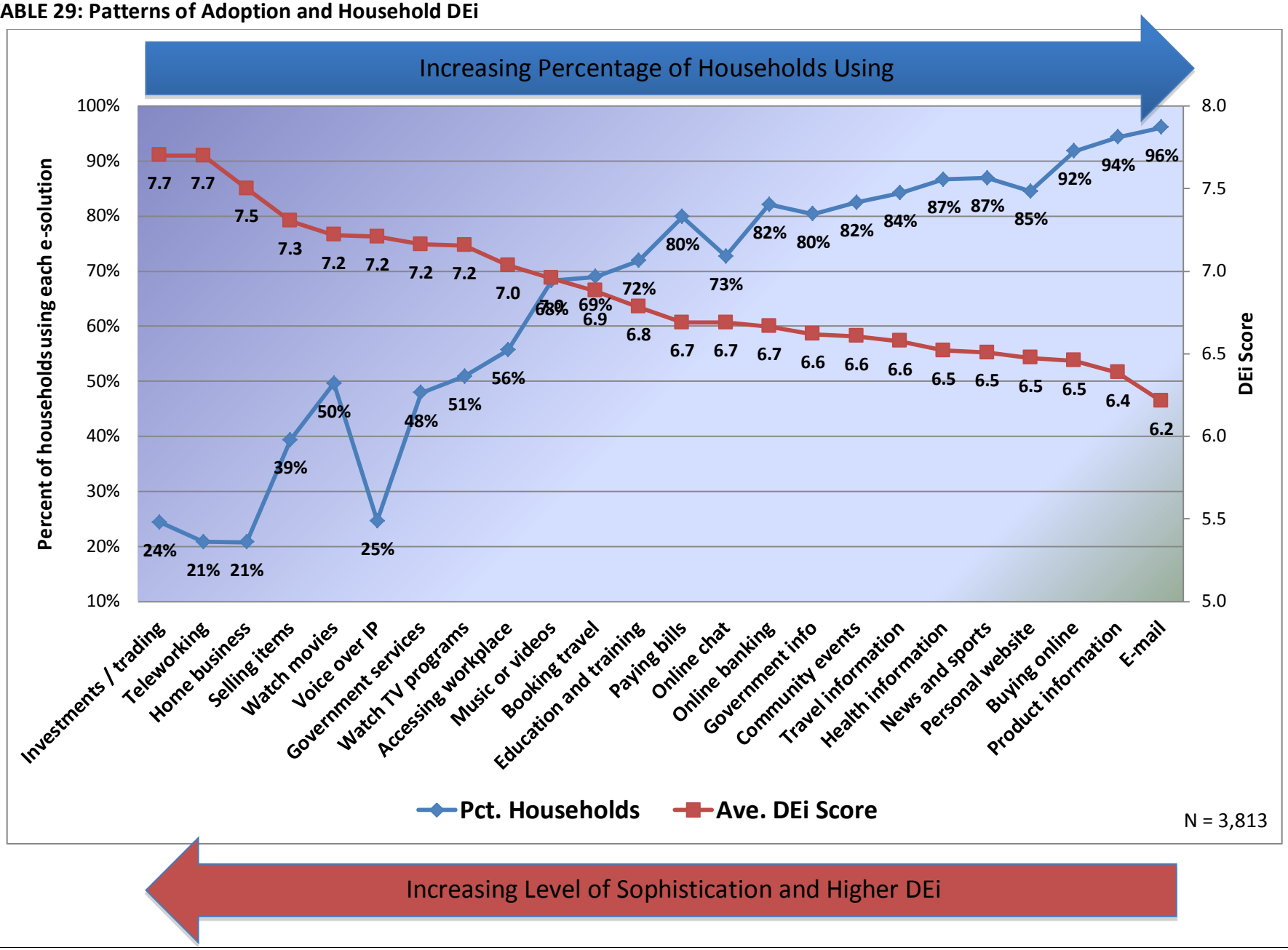
[6] A metropolitan area is defined by the Census Bureau as having a core urban area of over 50,000 with a population density greater than 1,000 people per square mile. A Micropolitan area has a population of 10,000 to 49,999. A small town has a population of 2,500 to 9,999. The category of "isolated small town" includes the remainder.

3.3 Areas of High Variation in Utilization

Similar to the situation facing organizations, many types of Internet utilization by households are more complex and sophisticated in nature, requiring above average skill levels. These complex e-solutions tend to be slower to be adopted. The chart on the next page shows the rate that each type of utilization is adopted by households relative to their DEi scores. For example, with a state-wide average DEi of 6.1, approximately 87 to 96 percent of "average" users will be currently using the "quick to adopt" applications and process noted below. In contrast, only 20 to 25 percent of "average" users will be currently using the "hard to adopt" e-solutions. Those with lower utilization adopt the easier to use applications first while more sophisticated and difficult applications tend to be adopted later, especially by organizations that already have high utilization.

Quick to adopt e-solutions	Slow to adopt e-solutions
E-mail	Investing online
Obtain product information	Home-based business
Buy online	Teleworking
News and sports	Voice over IP
Health information	

TABLE 29: Patterns of Adoption and Household DEi



3.4 The Impact of Lower Utilization on Households

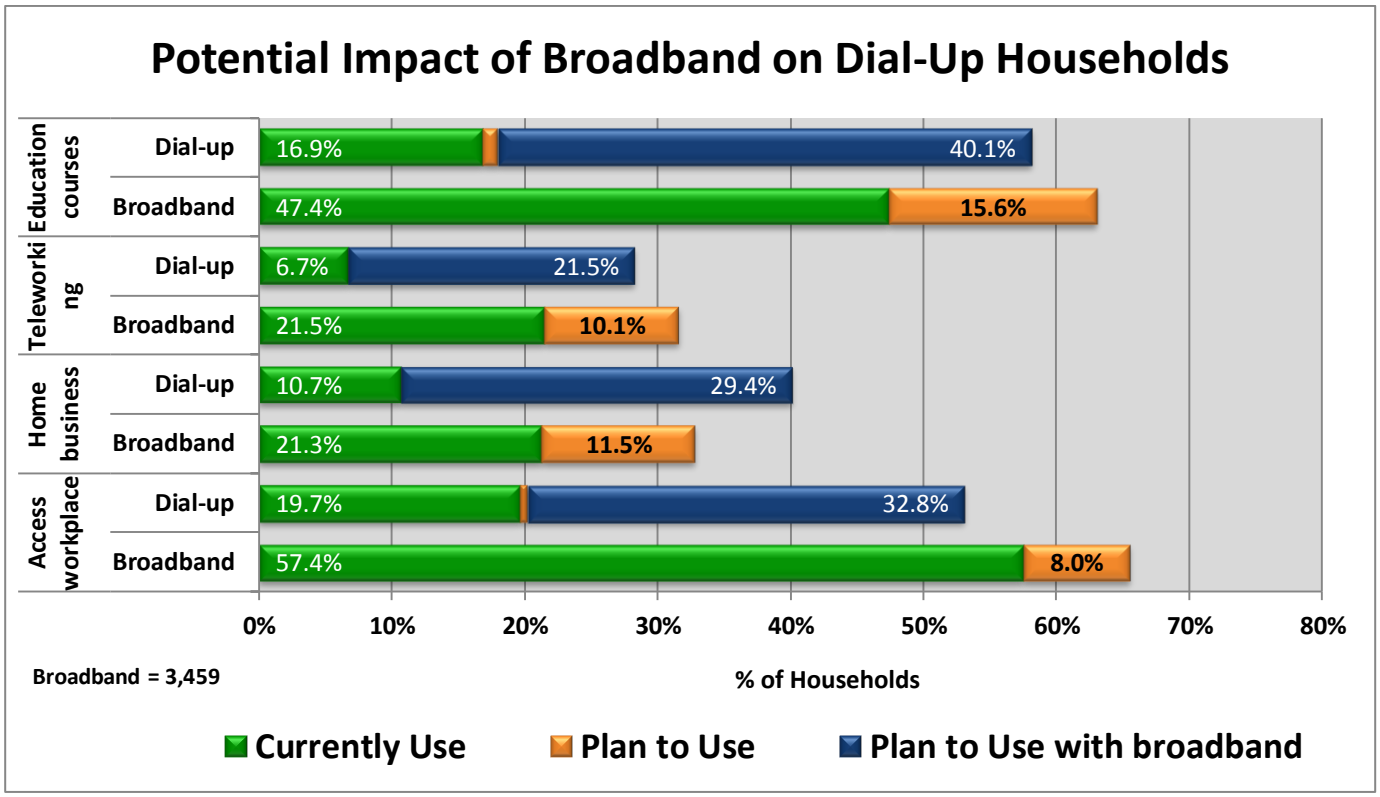
Looking at the different regions in Kentucky, it is clear that regions with the lowest skill levels and utilization have the lowest use of the Internet for personal productivity and earning income. The following table shows how regions perform in four areas that have major impact on employment and earning income. Areas shaded in green have higher than average utilization, while those in red have lower than average utilization. As in other utilization categories, the North region leads. The West region stands out as lagging in all four areas.

TABLE 30: Percentage of Houses Currently Using Internet for Productivity Uses

Productivity Category	Central	East	North	Northeast	West
Accessing workplace	51.1%	56.2%	59.1%	59.2%	52.1%
Education or training courses	48.9%	50.5%	44.3%	46.5%	42.2%
Home business	21.4%	17.0%	24.0%	21.0%	19.5%
Teleworking	18.6%	16.7%	26.6%	24.5%	15.8%

The impact of moving from dial-up to broadband is particularly visible on household productivity. As seen in Table 31, a large portion of households with dial-up connections indicate that they plan to move to broadband with the intention of adopting new productivity applications.

TABLE 31: Difference in Use Between Households with Dial-up and Broadband Connectivity



3.5 How People Prefer to Learn

In the previous section, the issue of gaps in utilization by household and regional characteristics was explored. Closely related is the issue of how households acquire the skills required to overcome those gaps, especially their lack of technical skills and discomfort with technology.

So what are the preferred means for people to acquire the skills and knowledge needed to overcome gaps in utilization? The following charts outline the preferences for dial-up households and seniors. What is evident across all groups is the strong preference for informal means of acquiring information, either through talking to others and self-directed online information. Formal courses and face-to-face classes are by far the least preferred means of learning for all groups.

TABLE 32: Preferred Learning Methods for Dial-up Households

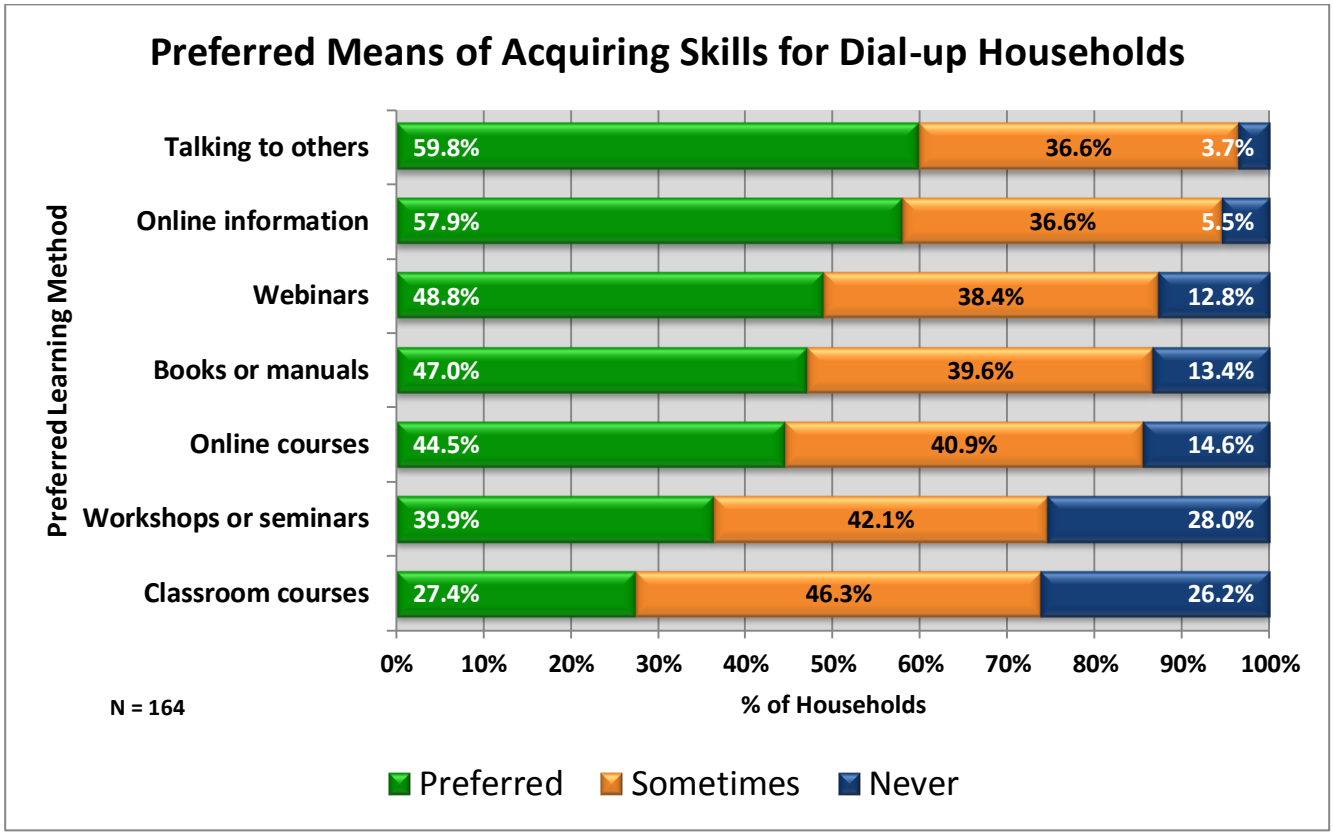
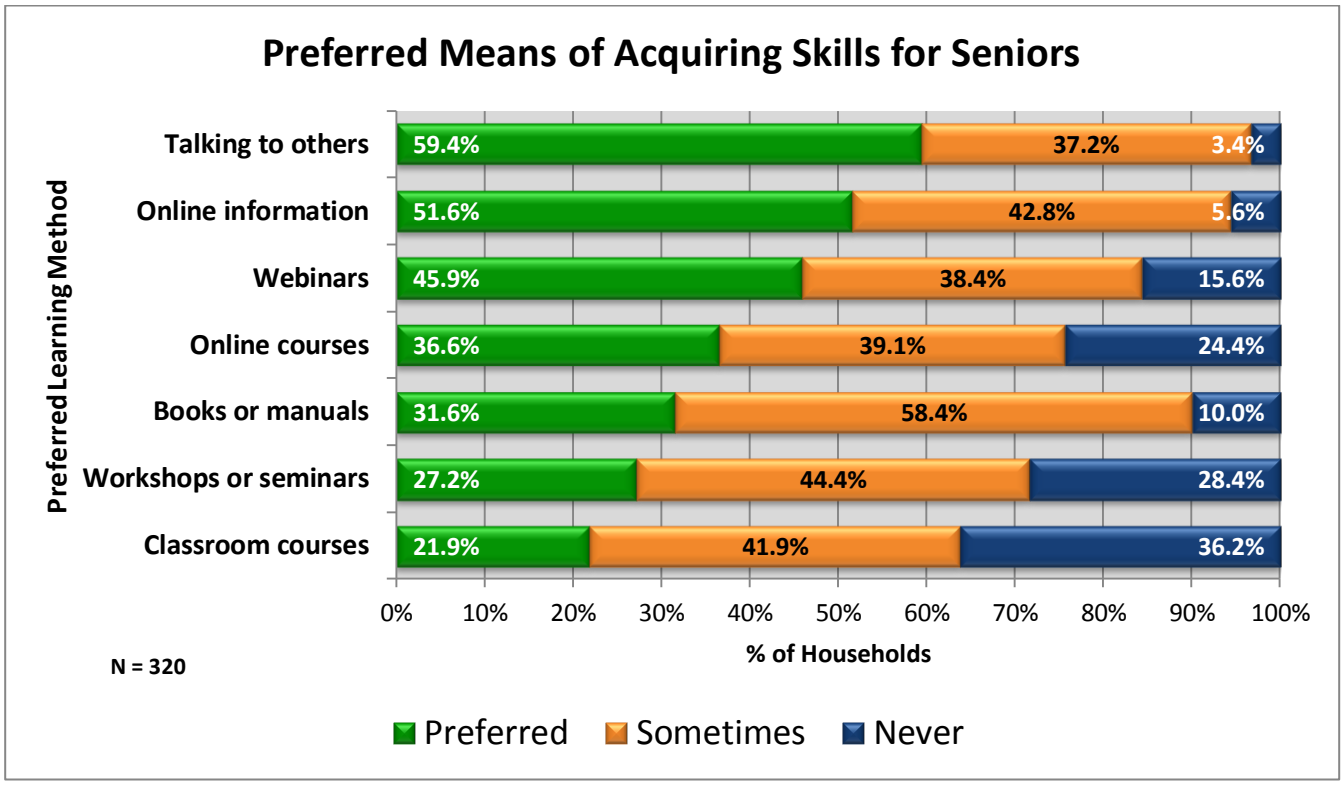


TABLE 33: Preferred Learning Methods for Seniors



Recommendation #7: In designing initiatives to increase and improve Internet utilization by households and organizations, considerable weight should be given to those learning methods that are preferred by the target populations.

Rather than trying to entice target populations into existing programs (such as classroom courses), e-solution adoption initiatives should reflect the preference for both self-directed online resources, as well as existing informal networks that already have participation by these target groups. These can include seniors' centers, libraries, churches and community centers.

3.6 Non-Adopting Households

While this report focus primarily on how organizations and households utilize and benefit from the Internet, the Commonwealth of Kentucky broadband efforts include promoting Internet adoption throughout the population. As a result, the issue of non-adoption of the Internet by a significant portion of the population is a concern that is included in the broadband planning efforts of the Office of Broadband Outreach and Development (OBOD).

To provide data on non-adoption issues two main sources have been used. First, there is a wealth of insightful and consistent national data on non-adoption that has been produced by the Pew Internet & American Life Project, as well as by the US Department of Commerce. In addition, as part of OBOD's efforts, a Kentucky specific survey was carried out by Michael Baker Jr., Inc, working in collaboration with the Kentucky Council of Area Development Districts. This survey (referred to hereafter as the Kentucky Non-Adoption Survey) consisted of a circulating "hard copy" surveys to individuals who identified themselves as not being Internet users. The surveys were not administered in a randomized manner, so results cannot be assumed to accurately represent the total population of non-adopters in Kentucky. Nonetheless, the 851 completed responses are indicative of the dynamics involved in non-adoption and are very insightful.

3.6.1 Patterns of Non-Adoption

National studies have been remarkably consistent in their findings on which demographic groups have the lowest adoptions rates. Both the Pew and Department of Commerce studies show that approximately one in five (20 percent) of Americans does not use the Internet[7]. While the non-adoption rate dropped steadily throughout the decade from 2000 to 2010, recent data suggests that the rate has not changed over the last two years.

> "Ultimately, neither race nor gender are themselves part of the story of digital differences in its current form. Instead, age (being 65 or older), a lack of a high school education, and having a low household income (less than $20,000 per year) are the strongest negative predictors for Internet use."
>
> Pew Internet & American Life Project – Digital Differences, April 2012 Page 6.

As for why people do not use the Internet, the most recent research by the Pew Internet Project has shown that "among current non-Internet users, almost half (48%) say the main reason they don't go online now is because they don't think the Internet is relevant to them—often saying they don't want to use the Internet and don't need to use it to get the information they want or conduct the communication they want. About one in five (21%) mention price-related reasons, and a similar number cite usability issues (such as not knowing how to go online or being physically unable to). Only 6% say that a lack of access or availability is the main reason they don't go online."[8]

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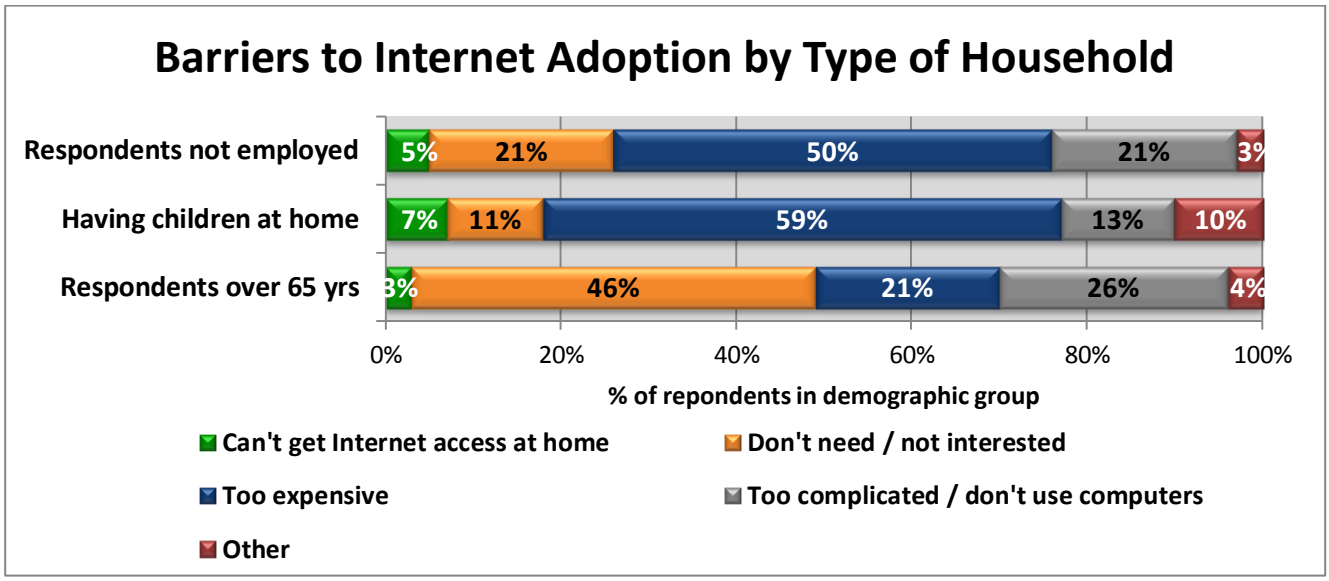
[7] See: *Digital Differences,* Pew Internet & American Life Project*,* April 2012; *and, Exploring the Digital Nation - Computer and Internet Use at Home*, US Department of Commerce (Economics and Statistics Administration and National Telecommunications and Information Administration), November 2011. Based on Current Population Survey of the Census Bureau.

[8] *Digital Differences – Page 6.*

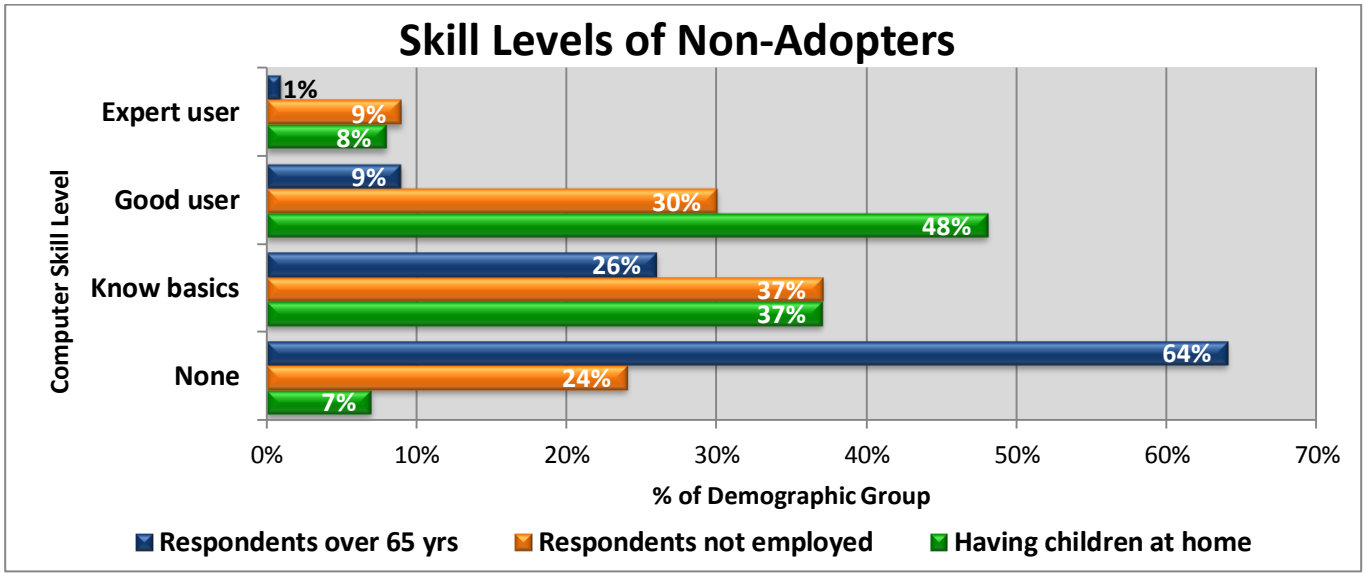
The Kentucky Non-Adoption Survey results show that the reasons for non-adoption vary significantly between different demographic groups. The information in Table 34 provides information that is very valuable in designing strategies and programs aimed at increasing adoption rates. Seniors are far more likely to cite lack of interest (46 percent), while those who have children at home or who are unemployed cite cost as the primary barrier to using the Internet[9].

TABLE 34: Barriers to Internet Adoption by Type of Household



In a similar line, Table 35 shows that seniors are far more likely to lack the skills needed to adopt and use the Internet. This is consistent with the relative skill levels of those who actually use the Internet.

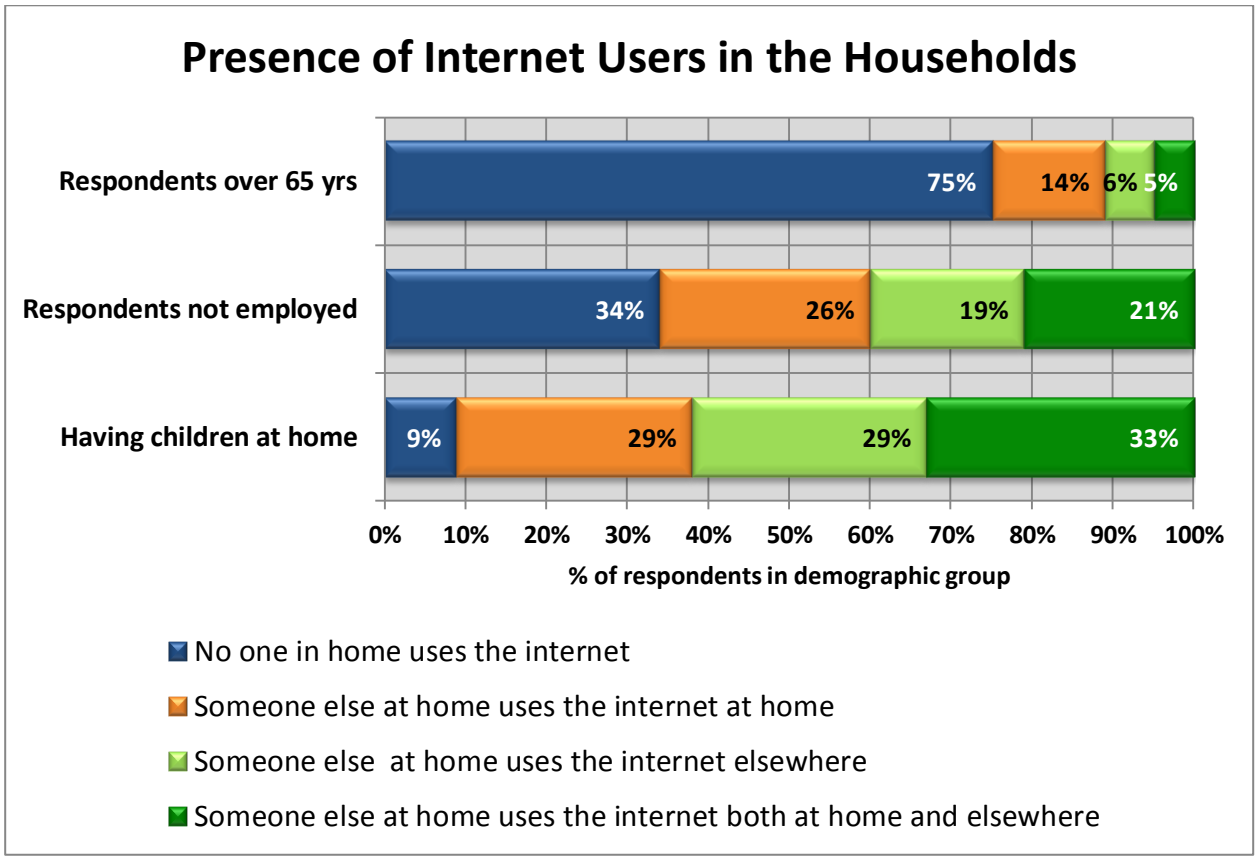
TABLE 35: Internet and Computer Skills by Type of Household



[9] Sample size in the tables 34 to 36: Respondents not employed: 239, Respondents having children at home: 178, Respondents over 65 years old: 392.

While the preceding tables provide data valuable in designing Internet adoption programs for specific groups, Table 36, demonstrates that some population groups may be more vulnerable or isolated due to their non-adoption. Of non-adopters with children at home, only 9 percent live in households where no-one uses the Internet. This may be a high priority group given the desire to ensure all children have the skills and opportunity to participate in the economy and society. However, it is equally evident that this is a small group. Conversely, 75 percent of non-adopters over the age of 64 live in households where no-one uses the Internet at all. This group is very isolated from the Internet and generally unable to use indirect means to access information and services on the Internet.

TABLE 36: Internet and Computer Skills by Type of Household



The issue of isolation of elderly households from the Internet is not necessarily offset by the growing penetration of smart phones. The Pew Center notes that some groups with traditionally high non-adoption are using "smart phones" as their primary means of accessing the Internet. This appears to apply to minorities and lower income households, but not seniors. [10]

[10] *Digital Differences* , Page17.

Recommendation #8: ***Broadband adoption programs should focus on those key groups that face persistent barriers to adoption, specifically elderly households and lower income households where no-one else in the household uses the Internet. Internet adoption programs should be design to address specific barriers facing their targeted group.***

Approximately one in five individuals in Kentucky does not use or benefit from the Internet. The largest group of non-Internet users are those 65 years and older. However, lower income households also have significantly lower rates of Internet adoption. Barriers to Internet adoption vary significantly by type of household. Almost half of non-adopting older households see little value in the Internet, while generally being less skilled in use of computers and Internet. Working age individuals tend to have better computer and Internet skills, but find having Internet at home too expensive. These working age 'non-adopters" are more likely to have children at home and have at least one other person in the household who uses the Internet. These working age households are less likely to be completely isolated from the Internet.

4. Summary and Next Steps

This report sets analyzes how organizations and households in Kentucky utilize broadband. It considers different industry sectors and household types and regional variations within those groupings. It also considers what kinds of actions will improve their performance and how they could benefit further from broadband.

The objective of benchmarking utilization of the Internet is to provide "actionable intelligence" to governments, stakeholders, and individuals. Taking action on the recommendations included in this report will enable Kentucky to move towards the realization of further benefits from broadband.

Appendix 1: Breakdown of Regions by County

West	County	Population	Median Income	% in Poverty	Incidence of 65+
Kentucky		***4,339,367***	***$40,061***	***18.4%***	**13.3%**
Green River	Daviess	96,656	$43,031	15.2%	14.6%
	Hancock	8,565	$48,464	13.2%	14.0%
	Henderson	46,250	$42,438	16.7%	14.2%
	McLean	9,531	$37,766	16.4%	16.9%
	Ohio	23,842	$37,965	17.4%	15.4%
	Union	15,007	$42,252	16.7%	13.7%
	Webster	13,621	$40,803	17.1%	15.1%
		213,472	***$41,817***	***16.1%***	***14.6%***
Pennyrile	Caldwell	12,984	$35,252	17.4%	17.8%
	Christian	73,955	$35,785	19.0%	10.3%
	Crittenden	9,315	$35,330	19.0%	18.1%
	Hopkins	46,920	$36,518	20.7%	15.4%
	Livingston	9,519	$40,921	14.7%	18.1%
	Lyon	8,314	$39,417	18.4%	21.0%
	Muhlenberg	31,499	$35,163	19.2%	16.2%
	Todd	12,460	$38,678	18.4%	14.2%
	Trigg	14,339	$42,967	15.3%	19.0%
		219,305	***$37,781***	***18.0%***	***14.5%***
Purchase	Ballard	8,249	39,995	14.9%	17.6%
	Calloway	37,191	34,947	20.2%	15.1%
	Carlisle	5,104	35,853	15.7%	18.9%
	Fulton	6,813	27,524	27.8%	18.0%
	Graves	37,121	34,550	20.2%	16.6%
	Hickman	4,902	37,045	18.6%	20.8%
	Marshall	31,448	41,891	14.3%	19.3%
	McCracken	65,565	40,976	15.5%	16.8%
		196,393	***$36,598***	***18.4%***	***17.1%***

Central	County	Population	Median Income	% in Poverty	Incidence of 65+
Barren River	Allen	19,956	36,563	17.9%	14.7%
	Barren	42,173	35,993	19.7%	17.6%
	Butler	12,690	33,499	20.1%	15.8%
	Edmonson	12,161	33,550	20.8%	16.6%
	Hart	18,199	29,989	25.3%	14.9%
	Logan	26,835	37,329	18.4%	15.7%
	Metcalfe	10,099	29,626	23.6%	16.3%
	Monroe	10,963	26,650	26.5%	17.1%
	Simpson	17,327	40,357	15.1%	14.3%
	Warren	113,792	43,316	17.1%	10.9%
		284,195	***$34,687***	***20.5%***	***14.0%***
Lincoln Trail	Breckinridge	20,059	37,074	20.8%	15.6%
	Grayson	25,746	31,936	21.0%	15.1%
	Hardin	105,543	45,358	14.7%	11.0%
	Larue	14,193	40,679	16.8%	15.6%
	Marion	19,820	35,609	20.6%	13.0%
	Meade	28,602	42,922	12.4%	10.4%
	Nelson	43,437	43,498	15.8%	11.7%
	Washington	11,717	39,742	16.6%	15.9%
		269,117	***$39,602***	***17.3%***	***12.4%***
Lake Cumberland	Adair	18,656	29,200	24.0%	15.3%
	Casey	15,955	27,247	25.8%	16.1%
	Clinton	10,272	25,776	27.1%	16.6%
	Cumberland	6,856	26,913	25.2%	19.1%
	Green	11,258	31,189	23.5%	17.3%
	McCreary	18,306	23,163	35.4%	12.3%
	Pulaski	63,063	32,038	19.5%	16.2%
	Russell	17,565	29,421	25.3%	17.4%
	Taylor	24,512	33,601	22.4%	16.0%
	Wayne	20,813	27,210	27.3%	16.0%
		207,256	***$28,576***	***25.6%***	***16.0%***

North	*County*	*Population*	*Median Income*	*% in Poverty*	*Incidence of 65+*
KIPDA	Bullitt	74,319	48,344	10.7%	11.2%
	Henry	15,416	42,733	16.8%	14.2%
	Jefferson	741,096	44,516	15.8%	13.4%
	Oldham	60,316	79,353	5.9%	9.2%
	Shelby	42,074	51,439	12.4%	12.0%
	Spencer	17,061	63,218	9.6%	10.2%
	Trimble	8,809	45,767	15.7%	12.9%
		959,091	***$53,624***	***12.4%***	***12.9%***
Northern Kentucky	Boone	118,811	67,994	7.9%	9.5%
	Campbell	90,336	50,033	11.1%	12.8%
	Carroll	10,811	43,862	17.3%	12.9%
	Gallatin	8,589	40,603	19.3%	11.4%
	Grant	24,662	42,814	16.7%	10.7%
	Kenton	159,720	50,957	13.2%	11.2%
	Owen	10,841	38,605	17.7%	14.5%
	Pendleton	14,877	44,195	15.4%	12.3%
		438,647	***$47,383***	***14.8%***	***11.2%***

East	County	Population	Median Income	% in Poverty	Incidence of 65+
Big Sandy	Floyd	39,451	29,725	30.3%	13.6%
	Johnson	23,356	32,063	22.9%	14.1%
	Magoffin	13,333	26,815	31.7%	12.9%
	Martin	12,929	25,825	45.0%	11.1%
	Pike	65,024	32,258	25.8%	13.7%
		154,093	***31,343***	***28.3%***	***13.4%***
Cumberland Valley	Bell	28,691	24,501	36.0%	15.7%
	Clay	21,730	22,255	43.3%	12.1%
	Harlen	29,278	26,356	33.4%	14.3%
	Jackson	13,494	25,634	30.7%	13.8%
	Knox	31,883	22,493	38.6%	14.6%
	Laurel	58,849	36,664	21.5%	12.9%
	Rockcastle	17,056	29,654	25.0%	14.8%
	Whitley	35,637	26,145	33.3%	14.3%
		236,618	***26,713***	***32.7%***	***14.0%***
Kentucky River	Breathitt	13,878	23,863	32.0%	13.4%
	Knott	16,346	29,375	23.7%	13.2%
	Lee	7,887	23,791	36.8%	13.2%
	Leslie	11,310	26,767	30.8%	14.2%
	Letcher	24,519	29,835	30.6%	14.2%
	Owsley	4,755	21,177	41.1%	16.8%
	Perry	28,712	29,660	27.7%	13.4%
	Wolfe	7,355	25,203	33.0%	15.6%
		114,762	***$26,209***	***32.0%***	***13.9%***

North East	County	Population	Median Income	% in Poverty	Incidence of 65+
Bluegrass	Anderson	21,421	51,486	11.0%	12.0%
	Boyle	28,432	39,687	19.8%	16.2%
	Bourbon	19,985	37,966	17.1%	15.3%
	Clark	35,613	44,908	14.5%	14.2%
	Estil	14,672	27,765	28.0%	15.3%
	Fayette	295,803	46,386	17.4%	10.5%
	Franklin	49,285	45,619	14.0%	14.0%
	Garrard	16,912	40,210	17.2%	14.6%
	Harrison	18,846	42,415	19.7%	14.9%
	Jessamine	48,586	46,940	14.1%	11.3%
	Lincoln	24,742	31,306	24.2%	14.9%
	Madison	82,916	40,241	19.2%	11.2%
	Mercer	21,331	44,256	14.5%	15.9%
	Nicholas	7,135	36,910	19.1%	15.6%
	Powell	12,613	30,954	30.8%	13.0%
	Scott	47,173	58,595	13.1%	9.3%
	Woodford	24,939	52,126	10.1%	13.0%
		770,404	***$42,222***	***17.9%***	***12.1%***
Buffalo Trace	Bracken	8,488	39,141	16.7%	13.7%
	Fleming	14,348	32,258	21.3%	14.8%
	Lewis	13,870	28,349	28.2%	14.7%
	Mason	17,490	37,987	18.8%	15.1%
	Robertson	2,282	35,050	22.2%	18.7%
		56,478	***$34,557***	***21.4%***	***14.9%***
Gateway	Bath	11,591	30,574	25.1%	14.7%
	Menifee	6,306	27,241	27.7%	15.9%
	Montgomery	26,499	32,964	21.1%	12.8%
	Morgan	13,923	29,473	30.9%	13.0%
	Rowan	23,333	33,081	26.6%	12.3%
		81,652	***$30,667***	***26.3%***	***13.2%***
FIVCO	Boyd	49,542	37,496	20.9%	16.6%
	Carter	27,720	33,888	25.0%	14.9%
	Elliot	7,852	27,486	32.4%	14.4%
	Greenup	36,910	39,382	16.0%	17.0%
	Lawrence	15,860	30,855	29.9%	14.2%
		137,884	***$33,821***	***24.8%***	***16.0%***

Appendix 2: Glossary

***Broadband KY* e-Strategy Report:** This report examines how organizations and households in Kentucky differ in their utilization of broadband and where they can look to make improvements. The report shows in detail how different industry sectors and household types compare to each other, especially between and within regions. The report provides insights and hard evidence that allows regions, businesses, and households to assess where they stand. The report provides recommendations on strategies for improving their Internet performance and benefits.

***Broadband KY* e-Solutions Benchmarking Technical Report:** This report presents the results of survey-based research carried out for the Commonwealth of Kentucky. The surveys collected information from businesses, organizations and households on the availability of broadband (high speed Internet access) and its uses, benefits, drivers and barriers. This largely descriptive report results provide insight into gaps and opportunities for increasing broadband utilization by organizations and households. The policy, planning and program implications for Kentucky and its regions are dealt with in a separate report: the *Broadband KY* e-Strategy Report.

Digital Economy Analysis Platform (KY- DEAP): The DEAP has been developed as an online resource that provides clients with access to the data collection results and the ability to customize their analysis across a range of variables, including industry sector or geographic region. The DEAP is accessed online by authorized users. Users are presented with **dashboards** for businesses and for households. Each dashboard is organized around a series of **pages** focused on specific topics, e.g. Connectivity, Utilization, DEi, Impacts, etc. Within each page is a set of predefined **reports** that present a chart and/or table of processed results from the datasets.

e-Strategies: e-Strategies are high level plans for achieving one or more goals related to improved access to and utilization of broadband Internet. e-Strategies define a course of action that is most likely to successful address opportunities, challenges or barriers related. Strategies are usually seen as distinct from detailed action plans which deal with specific issues of "who, what, when and how".

e-Solutions: refers to the integration of Internet technologies with the internal computer-based systems and applications within or among organizations for a variety of operational processes. e-Solutions encompass not only product delivery and payment transactions (e-commerce) but also all processes that may be facilitated by computer-mediated communications over the Internet.

e-Process: uses of the Internet which include internal operational uses, such as supplier coordination, training and teleworking.

e-Commerce: uses of the Internet which include activities related to the sales, marketing and delivery of products and services; and,

Kentucky Digital Economy Index (KY-DEi): The Digital Economy index (DEi) is part of the benchmarking process and provides reference points against which the performance of any individual or group can be compared. The DEi summarizes an organization's or household's utilization of a range of Internet applications and process – 17 for organizations and 30 for households. Based on the number of applications currently being used by an organization or household, a composite score is calculated that summarizes how

comprehensively each organization or household uses Internet-enabled e-solutions. The DEi can be used to compare organizations, regions, or industry sectors.

Utilization refers to the third stage in the broadband development process. The first stage is providing a community, household or organization with access (availability) to the Internet. The second stage is adoption or the process whereby a person or organization starts to actually use the Internet. The third stage is utilization whereby a person or organization uses their Internet connection to create value. Many people and organizations have access and have adopted the Internet, but are relatively ineffective in how they use and derive benefits from the Internet. The field of analysis labeled "utilization" explores patterns of Internet use and how these patterns can be enhanced.

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