Northwest Georgia Regional
DIGITAL ECONOMY PLAN

DIGITAL REGION 1

NORTHWEST GEORGIA REGIONAL COMMISSION

http://www.nwgrc.org/

P.O. BOX 1798

ROME, GEORGIA 30162-1798

Produced by Greg Laudeman Consulting

http://greg.laudeman.com/

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Digital Region 1

A plan for northwest Georgia to attract investment, grow businesses, increase prosperity, and support institutions with digital technology

Executive Summary

Today, we live in a digital economy in which success largely comes from getting the right technology and using it really well. Digital technology—software, especially[1]—is transforming what we do as well as how we do things. This is applies to organizations in every sector. It is also true for regions and individuals. Indeed, it is true for *all* of these *together*: Organizations in regions with abundant digital infrastructure and digitally skilled individuals get and use technology better. The challenge is to align the availability of skills and technologies with organizations' changing needs. The purpose of this plan—*Digital Region 1* (DR1)—is to build northwest Georgia's digital economy, to make sure digital technology resources and skills are available and used to attract investment, grow businesses, increase prosperity, and support institutions.

Currently, organizations spend approximately $23,000,000[2] per year on digital technologies in northwest Georgia. While this number is impressive, research for this plan suggests that organizations are actually *under-investing*: Digital technology is used primarily to reduce costs, particularly by reducing the need for manual labor. Organizations seem to have invested heavily in hardware but not much in software or skills. So, northwest Georgia is not achieving anything near the full benefits of digital technology, and we don't have critical resources to realize those benefits. There is a lot of room for growth in northwest Georgia's digital economy.

Organizations need to lead, to drive the development of regional technology resources. The benefits of technology—whether from generating revenue, improving quality of life, or solving social problems—are realized via organizations. Technology and technical skills can be very costly. Organizations have reason and capacity to go digital. *It is up to leaders to say what their organizations are trying to achieve, how technology can help, and what is needed to join the digital economy.* This plan is a starting point for that process, focused on northwest Georgia's economic drivers and supporting institutions:

- Education
- Healthcare
- Local government

[1] Software is key difference between the digital economy and digital technology. Computer code and digital data, especially on a large scale, enable automation and intelligence that simply has not been possible with traditional analog technologies. Phenomena such as ubiquitous computing, the internet of things, and big data are enabling unprecedented socioeconomic change.

[2] This estimate is based on total spending on information technology, services, and personnel reported in responses to the Organizational Technology Survey. Responses were analyzed for average spending per employee, broken out by industry. The average information technology spending per employee in each sector was then multiplied by the number of employees in each sector. This figure does not include spending for sectors that had no survey responses.

- Manufacturing
- Tourism
- Small business

As an economic development plan, DR1 must have measurable impacts on productivity and prosperity. For each of these sectors, and for the regional economy overall, the objectives of the plan are to increase:

- Technology investment and use by organizations
- The number and sizes of the region's technology companies
- The number of technology jobs and occupations
- Income & wages via digital leadership and workforce skills

Strategic focus

The strategic focus of DR1 is to leverage hardware and infrastructure investments with complementary investments in software and workforce in order to promote top-line growth. Our research shows that northwest Georgia has generally very good digital infrastructure. Leading organizations in all sectors we examined have invested in hardware. The value of hardware and infrastructure depends on software applications and workforce skills, which depend on each other. Together, these things make it possible to improve processes and increase incomes, which generates resources and opportunities.

Advanced manufacturing and other basic industries drive this strategy, which builds on and supports education, healthcare, local government, non-profit agencies and small businesses. The rationale is basically "uses strengths to address weaknesses." Manufacturing—along with other basic industries like tourism—is economically important because it brings capital into communities via purchasing, wages, and taxes, which support essential services and institutions. Nearly 25% of northwest Georgia's employees are in manufacturing, compared to 9% for the state and nation.[3]

Northwest Georgia's manufacturers are fairing well in the digital economy. Research conducted for this plan finds that manufacturers—particularly floor coverings—are aggressively adopting digital technology. They have invested heavily in hardware and are now focusing on software. They need more digital connectivity, advanced software and systems, and more technically proficient workers. Manufacturing and other basic industries can make technology investments without regulatory imperatives or voters to please, unlike education, healthcare, and local governments. Regardless, it can be difficult to finance technology investments.

The U.S. Department of Commerce recently recognized the importance of advanced manufacturing by designating the region a "Manufacturing Community" under the Investing in Manufacturing Communities Partnership (IMCP) program. This will allow the region to access federal funds to implement its advanced manufacturing strategy being prepared by the Georgia Tech Enterprise Innovation Institute, the

[3] Northwest Georgia Regional Population and Economic Assessment, included as an appendix

Northwest Georgia Regional Commission (NWGRC), and regional stakeholders. [4] The Milstein Commission, a high-level study group on "new manufacturing," recent report[5] noted that manufacturing is being transformed by digital technology. Their findings confirm ours: Lack of financing and workforce are major barriers to keeping up, particularly for small and medium enterprises. Many of their recommendations parallel tactics in this plan.

Education and healthcare organizations have invested heavily in hardware and infrastructure. Their software investments have either (a) been focused on cost reduction—e-texts are less costly than printed textbooks, for example—or (b) been driven by government mandate. Electronic health records (EHR) are a prime example. While EHR is intended to improve outcomes, those who participated in the digital economy planning process said that regulatory mandates have driven up costs and reduced productivity according. Both education and healthcare face perennial challenges with adoption and training.

One of the Regional Commission's primary roles is to assist local governments with planning and development. Local governments and non-profit agencies have generally lagged behind in using digital technology, largely they lack resources to plan and develop those uses. It makes sense to focus on this sector because it has so much to gain. A major issue for local governments is development and support of basic industries. To this end, the Regional Commission operates the North Georgia Certified Development Agency, which provides financing for business startups and expansions. Another role for the Regional Commission is to administer the Workforce Investment Board. The Workforce Innovation and Opportunity Act of 2014 is intended to streamline workforce development, to make it more flexible, and to better align with economic development and education. The *Digital Region 1* plan's focus on software and skills directly and indirectly addresses all of these roles.

The plan is to leverage investments by basic industries for broader and deeper investments by other sectors. Digital improvements in support sectors will provide basic industries with an educated and healthy workforce, safe streets, etc. In order to grow its digital economy northwest Georgia needs capital to deploy enterprise software, expand network access, and improve digital skills. Therefore, the *Digital Region 1* plan includes tactics to increase the availability of capital for intangible goods such as software and training.

The Digital Economy Planning Stakeholder, Process, and Findings

The Digital Region 1 Plan came out of a six-month process of gathering information from leaders in these sectors. At least 211 organizations contributed to the plan, many contributed in multiple ways. The plan started from the premise that for the region's economy to develop organizations must grow and improve. Digital

[4] Investing in Manufacturing Communities Partnership: Northwest Georgia Manufacturing Community, http://www.eda.gov/challenges/imcp/files/IMCP_2_Pager_Handout_Georgia.pdf

[5] "Building a Nation of Makers: Six Ideas to Accelerate the Innovative Capacity of America's Manufacturing SMEs," Milstein Commission on New Manufacturing, The Miller Center, The University of Virginia, June 2014, http://web1.millercenter.org/conferences/milstein/MilsteinReport-Manufacturing.pdf

technology can enable all of this. Is northwest Georgia digitally ready? Table 1 provides an overview of the region's strengths, weaknesses, opportunities, and threats for each area of digital readiness. It shows where organizations in northwest Georgia have put their technology dollars.

Generally, the region has a solid technology base of connectivity, hardware, and infrastructure. Many organizations in the targeted sectors have recently or are currently upgrading their computer hardware. Network service providers have extensive infrastructure in the region. Leading organizations in our targeted sectors are prospering with technology, particularly using it to reduce costs and improve efficiency. There are locations—including major commercial and industrial sites—that need better, more flexible, or even just basic network services. And, there are needs for on-going investment in hardware, particularly handheld, mobile devices.

The critical needs and opportunities are for software and skills. Northwest Georgia should focus on top-line growth via digital technology[6]. The hardware and networks for this is largely in place. Organizations in the region need better and more software, and technically skilled workers to build, deploy, and use the software. Technologists need to know operations in order to improve processes, replace old technology, and work with other professionals and customers. All of this requires capital, and it can be especially difficult to find financing for intangible goods like services, training, etc. These findings are summarized as an analysis of digital readiness strengths, weaknesses, opportunities, and threats in table 1.

[6] "Digital technology" necessarily includes software—code and data—because it determines how hardware and infrastructure operate.

Table 1. Overview of regional digital readiness strengths, weaknesses, opportunities, and threats

Areas of Digital Readiness	*Internal*		*External*	
	Strengths	Weaknesses	Opportunities	Threats
Business Operations & Processes	Bottom-line, Cost control, efficiency, and reduced need for manual labor	Top-line growth & revenue generation; difficulty and lack of financing	Lean production & startup and strategic innovation; multiple funding sources	Competitors leap-frogging, market foreclosure; funders focus on real assets and short-term job-creation
Workforce Skills & Capabilities	Basic IT workforce	"Hybrid" IT; broad digital skills, deep technical expertise; information about workforce demand & supply	Abundant developmental resources, including informal and non-traditional	Strong demand and higher pay elsewhere, including adjacent markets (Atlanta, Birmingham, Chattanooga, etc.)
Software Applications	Enterprise systems of record (accounting, etc.)	Systems for differentiation and innovation	Emerging platforms for revenue growth and open-source applications	Lack of provider or vendor support for emerging "minor" markets
Code & Data	Movement toward analytics (e.g., EHR in healthcare and ERP in manufacturing)	Legacy systems, past transaction; data stuck on paper	Big data and cloud computing; new development frameworks	Lack of standardization; too many frameworks
Network Connectivity	Middle mile, basic connectivity to areas with strong demand; long-term, static connections	Last mile or 100 feet into locations without strong demand; short-term, flexible connections	Public-private partnerships for targeted infrastructure improvements	Other locations actively marketing digital readiness and high-performance networks
Hardware & Infrastructure	Recent investments by providers and by major organizations	Virtualization, cloud, and bring-your-own-device; automation for SMEs	Low cost devices for end users and general purposes	Rapid depreciation and obsolescence; expensive, proprietary devices: platform diversity

Note: Each row in this table ("area of digital readiness") corresponds to a layer in the "stack" model discussed in the Introduction section of this report. This model all the things needed for functional digital systems.

Digital Region 1: Growth and Improvement via Technology

The digital economy plan is to focus on "top line"[7] benefits of digital technology—how it can fuel growth and improve outcomes. It is important to continue using digital technologies to increase efficiency and substitute for manual labor. But, this does not increase economic growth unless workers are transitioned to higher-value work. Using digital technology for improvement to generate greater customer value drives demand for and investments in technical skills, in contrast with use that focuses on cost reduction. More importantly, top line growth attracts investment as it generates wealth, expanding the tax base, and providing support for local cultural and social institutions. The critical issues for Digital Region 1 are:

- *Engaging owners, top officials, executives, and other key decision-makers* in using digital technologies for top line growth and improvement
- *"Selling" people on digital technologies and technical jobs* in order to get broader and deeper digital skills in the region's workforce
- *Increasing availability of capital to finance software and services* for improvements and innovations that increase customer value and revenue

Leaders should focus on how digital technology can improve their organizations and can grow in the region's digital economy. But, they should also understand that digital technologies present new types of threats even as they provide new and better ways to deal with old threats. Regional leaders should work together to develop, manage, and promote economic resources via digital technologies. Specifically, focus on location, natural resources, network infrastructure, and, of course, workforce to attract high-value, rapidly growing industries. The challenge with this is *innovation*. The targets for attraction and recruitment will almost certainly put a premium on innovation. The old "cheap land, cheap labor, y'all come" attraction and recruitment strategies are unlikely to work (let alone result in technology-based top-line growth). Leaders need to create or find innovative approaches to attraction and recruitment that fully capitalize on digital technologies.

Focusing on how the region is *using* digital technologies is an innovation. This approach requires information about the region's technology assets, but focuses on the impacts or value generated (benefits minus costs) rather than the technology itself. The practical functions of technology—what it does—would need to be clearly understood. The purpose of a "use approach" might be to identify these functions. A variation of this approach would be to identify best practices, case studies, and exemplars of digital technology uses from around the nation and world as benchmarks for comparison, or as models for northwest Georgia.

Essentially, the regional digital economy plan is to *learn*. Key decision-makers are aware of their need for knowledge, and want to know more about how to acquire and use digital technologies. They want to better use the technology and get better

[7] "Top line" refers to gross sales or revenue and those factors that increase customer value or willingness to pay. In contrast, "bottom line" refers to revenue minus expenses, including factors that increase or reduce costs.

impacts. The dual focuses of learning for key decision-makers should be how to increase revenue with digital technologies, rather than just reduce costs, and how to improve workforce productivity by increasing technology skills. The challenge is that workers' skills must fit with *future* technology.

As the leaders are engaged in learning about digital technologies for top-line growth, workers must be developing fundamental skills that would enable that type of growth. These fundamental skills are creative, collaborative, and social as much as technical. Then implementation digital technologies for top-line growth must be done in a manner that layers deeper and more advanced skills on top of those fundamental skills. All of this depends on being able to finance and invest in digital technologies. Although the finance sector has been a leader in digitization, it is still fixated with real assets, making very difficult to fund services and software.

Digital Development Strategies and Tactics

In order to build, grow, and strengthen northwest Georgia's digital economy first establish some fundamental resources, then explore and learn about how to make the most of digital technology, and finally make targeted investments via public-private partnerships that will catalyze additional growth. Each of the tactics below address one or more areas of digital readiness (refer to table 1). A work plan, including timeframe and cost estimates is included in the appendices. The DR1 plan is to pilot tactics in a few places that have demonstrated support for digital development, work out the bugs, and then roll them out to the rest of the region:

Strategy 1 **Develop resources to promote & support digital development**

Make sure we have what we need to grow northwest Georgia's digital economy, including expertise, financing, and marketing.

Tactic 1.a Establish a team of technology champions from leading organizations in target sectors to share their expertise and promote digital technology

Addresses: All areas of digital readiness

Tactic 1.b Develop a technology financing program, leveraging commercial lenders and economic development agencies

Addresses: Workforce Skills & Capabilities, Software Applications, Code & Data, Network Connectivity, Hardware and Infrastructure

Tactic 1.c Provide a digital strategy template/tool for organizations based on information technology best practices

Addresses: Business Operations & Processes

Tactic 1.d Brand and market Digital Region 1

Addresses: All areas of digital readiness

Tactic 1.e Assess demand for and supply of digital skills, particularly for industrial automation and internet technologies

Addresses: Workforce Skills & Capabilities

Strategy 2 **Explore and learn about digital technology for top-line growth**

Celebrate what we're doing with digital technology and discover what's possible in the digital economy

Tactic 2.a Conduct "Grow Digital" programs for small businesses, non-profits, and government agencies

Addresses: Business Operations & Processes, Software Applications

Tactic 2.b Convene a few large conferences about how to make the most of digital technology

Addresses: All areas of digital readiness

Tactic 2.c Conduct multiple small hands-on workshops highlighting particular technologies to engage and inform leaders and workers

Addresses: All areas of digital readiness

Tactic 2.d Offer "externships" for students and job-seekers to explore tech occupations by helping others use digital technology

Addresses: All areas of digital readiness

Tactic 2.e Establish a network of "makerspaces" oriented toward automation and other top-line applications of digital technologies

Addresses: Workforce Skills & Capabilities, Software Applications, Code & Data, Hardware and Infrastructure

Strategy 3 **Make targeted investments via public-private partnerships**

Build partnerships to divide the costs and multiply the benefits of deploying critical technology assets

Tactic 3.a Jointly procure technology, particularly software and training for local government and non-profit agencies

Addresses: Workforce Skills & Capabilities, Software Applications, Code & Data, Network Connectivity, Hardware and Infrastructure

Tactic 3.b Create Wi-Fi clouds and "walled garden" websites for central business districts, cultural and recreation assets, public facilities, and other destinations

Addresses: Code & Data, Network Connectivity, Hardware and Infrastructure

Tactic 3.c Build "plug & play" high-performance network access into industrial and major commercial/office sites

Addresses: Network Connectivity, Hardware and Infrastructure

Tactic 3.d Conduct "open sources" demonstration projects, particularly with local governments, non-profit agencies, and small businesses

Addresses: Business Operations & Processes, Software Applications

Tactic 3.e Develop remote/rural broadband services

Addresses: Network Connectivity, Hardware and Infrastructure

Each component of this plan directly addresses one or more areas of digital readiness in order to achieve the overall goal and purpose of *Digital Region 1*. While the tactics can be implemented independently, each strategy builds on prior strategies and tactics. Each also has built-in benchmarks and milestones. The general objectives above provide metrics for these strategies and tactics so they can be tracked and evaluated against the digital economy plan goals. And, all of these tactics build on numerous efforts and resources in the region, particularly among educational institutions, to build the workforce, increase access to capital, and grow the region's economy.

Implementing DR1

Digital Region 1 fits well with the Regional Commission's overall purpose and enables it to move into the digital economy, too. The Northwest Georgia Regional Commission currently has few resources to implement this plan. There are several practical ways to achieve the plans goals and objectives:

- Make implementation collaborative, distributed, and open process. Several goals can be achieved simply by repositioning existing programs or resources (financing, for example) or by building on and promoting standard practices and technologies. Be sure that anyone who wants to help has a clear and simple way to get involved and make a contribution. Working through existing organizations, such as Chambers of Commerce and development authorities, will make the plan go farther and faster. Use these relationships to build the public-private partnerships necessary to implement strategy 3.
- Initiate DR1 in locations and with stakeholders that participated in the planning process. Those who participated in the Digital Economy Plan process have demonstrated their interest in and understanding of the goals. An early stage of the implementation process should be to review the DR1 plan with them, and to dialog with them about specific tactical activities and outcomes. Identify how DR1 aligns with and complements existing activities, efforts, and goals.
- Ask for real buy-in and create sponsorship opportunities. DR1 does a lot for organizations of all kinds, particularly local governments, Chambers of Commerce, etc. The Regional Commission should ask for real buy-in in the form of resources, or at least a commitment to act on and participating in executing the plan. One simple way to accomplish this is to seek sponsors for particularly activities or facilities, including in-kind contributions and promotions.
- Enlist the support of technology providers. Digital development is, at the end of the day, business development for technology companies. They should provide funding and resources to execute the plan. This means implementation must have real payoffs for technology companies, but it also means they must be willing to educate and inform more than sell.

- Seek grant and other funding for particular tactics. Many parts of this plan fit with the priorities of private foundations and public agencies, as well as the mission of the Regional Commission. Leverage IMCP and other funding wins to acquire resources for specific objectives. Make special efforts to reach out organizations that exist to promote digital technologies, skills, etc.
- Establish a unit to lead implementation. While DR1 fits with the Regional Commission's purpose, it also goes beyond that purpose to focus on very different audiences, issues, outcomes, and even ways of working: Digital technology. The DR1 unit would have to be small and lean and catalytic. Its overall purpose would be to coordinate and enable others to drive digital development, primarily by convening events, developing resources, and disseminating information. Ideally, the DR1 unit would be able to leverage Regional Commission resources. It would also need the flexibility to develop and tap new sources of support, and to use different means to achieve evolving purposes.

The economy is now all caught up in digital economy. Prosperity for northwest Georgia means capitalizing on the digital infrastructure we have recently developed. In order to get good return on investments in hardware, we need powerful software and abundant skills. The software is available and the skills can be developed. The real challenge is to just understand what's possible, to get a vision for using technology, and to translate that into new products and services, expanded market reach, greater income, and higher profits, while enhancing quality of place. Such technology use will be a magnet for industry and capital investment, resulting in more and better job opportunities. That is *Digital Region 1*.

Digital Region 1

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Introduction

The purpose of Digital Region 1 is to ***grow businesses, attract and retain industry, and support institutions with technology***, and to avoid technological pitfalls and problems. The Northwest Georgia Regional Commission developed this plan to make sure northwest Georgia has abundant supply of and fully capitalizes on digital technologies. *We want to make the most of every opportunity to use digital technology to increase employment, improve quality of life, and attract people and industry to our region.* This requires visionary leadership, flexible capital, high-performance infrastructure, and skilled workforce, as well as hardware and software.

Northwest Georgia has abundant digital hardware and infrastructure, but *having* technology isn't enough because it can just be a cost and a way to send our money out of the region. Individuals and organizations must *use* the technology, and use it better than their competitors. It is widely recognized that effective use of digital technologies can make the difference between success and failure, between being an industry leader and being a has-been. We don't want this to happen in northwest Georgia. In fact, we want the opposite: Great technology being used so well that everyone in the region prospers.

What is the Digital Economy?

The Digital Economy consists of business conducted through computers and computer networks. Manufacturers use computers to control and track their processes, from raw materials to finished, delivered products. Farmers use wireless moisture sensors on farms to increase yield and use the Internet to advertise and sell their crops. Doctors see patients using telemedicine, detectives use social media to investigate crime and lawyers search and find legal precedents through online search rather than through paralegals and clerks. It is difficult to find a business or institution in Georgia that does not rely on the Internet and digital technology to improve service, lower cost, automate work, or expand into new markets.

The Digital Economy is not a replacement of our economy but an evolution of using technology to adapt business to global innovation. The Digital Economy is enabled by access to information technology infrastructure, skilled workforce and funding to incorporate these technologies and services into business operations. Computers, mobile phones, tablets, sensors, software applications and broadband networks are basic ingredients. Education, a skilled workforce, adult learning, and the financial resources to incorporate new technologies are critical enablers.

As business adoption of the Internet reaches critical mass, competition will intensify for companies and workers alike. It can produce benefits that include wider access to resources, more effective health-care and education systems, and a workforce with greater skills. Georgia's ability to incorporate and use them directly affects its competitiveness.

Why is digital technology important?

How often do you have to make decisions? In order to make those decisions—large or small—you need information. What are the options, and the pros and cons for each? What do you need and how do you get it? How do you coordinate activities and track assets? What and who is coming, going, in process, etc.? Digital technology makes decisions easier by providing answers to questions like these. It allows you to work better, cheaper, and faster by easily and quickly getting accurate information. Digital technologies are especially good for making decisions with others—constituents, customers, employees, partners, patients, students, etc. Essentially, digital technologies enable us to make decisions and work together better.

Northwest Georgia can grow and prosper if those in the region make better decisions faster, if they can create, invest, and work smarter than individuals and organizations elsewhere. Digital technology is important to the region when it allows individuals and organizations to do specific things better than others, including coming up with new products, services, and techniques/technologies.

Digital technologies are important if they are used to bring more money into the region. Local and regional economies consist of "basic" or "traded" industries that produce goods and services that are purchased elsewhere, bringing capital and wages into the area. Basic industries thrive when they have some advantage over competitors elsewhere. There are also "support" or "untraded" industries—including local governments, institutions, and non-profit agencies—that provide goods and services to those within the region. Support industries thrive when they give basic industries an advantage. Both basic and support industries thrive when they continually improve their efficacy, efficiency, and overall performance. They produce better products and services for export or to replace imports. Digital technologies are important because they make this possible.

Organizations demonstrate the importance of digital technology by spending on it. Research for this plan suggests that organizations in northwest Georgia spend approximately $23,000,000 per year on digital technologies. Of course, organizations spend this money because digital technologies enable them to operate better but the fact that so much money is spent on digital technologies makes them important. Our research suggests that organizations in northwest Georgia could do much more with digital technology, and they are likely under-investing. So, digital technology could be even *more* important for the region, and the region's economy is at risk because organizations are doing more with technology. The opportunity is to greatly increase investments in digital technologies by greatly increasing the benefits organizations in the region realize from digital technologies.

The challenge is that digital technology is constantly changing. Information and knowledge are necessary to get and use digital technologies better and cheaper. Such information and knowledge can be very expensive. This expense can be reduced via collaboration and sharing. Digital technologies are also important for sharing knowledge and learning *about* getting and using digital technologies to:

1. Produce better products and services for export and for local consumption, and more effectively promote regional products and services, and the region as a whole
2. Give individuals and organizations in the region an advantage over those outside the region
3. Strengthen the complementary, positive relationships between basic and support industries, particularly small local businesses, and institutions

Why is a digital economy strategy important to Georgia?

The Digital Economy will increasingly impact Georgia, therefore, a long-term strategy and planning is critical in providing stability and opportunity for future generations. The Digital Economy is creating new industry and new business opportunities such as one Georgia startup company, AirWatch, that sold in 2014 for over $1.5B. New technologies have lowered the costs and opened access to markets anywhere in the world by anyone in Georgia who has access to the technology, knowledge, skills and the drive to pursue them.

The Digital Economy disrupts businesses and institutions that took decades to build. Jobs are being lost to off-shoring of manufacturing enabled by the technologies and networks of the Digital Economy. Many video and record stores, bookstores, and even shopping malls were other early victims. This trend will accelerate. One study done by Oxford Professors indicates 47 percent of current professions could be at risk for automation by 2025[8].

The Pew Research Center's Internet Project has been analyzing the impact of the Internet for over a decade. Its most recent study in August 2014 analyzes how daily life will be changed by 2025 through the Internet, artificial intelligence and robotics after speaking with almost 2,000 widely quoted technologists and analysts. The conclusions directly quoted below emphasize how large a role the Digital Economy will play in the future[9]:

Key themes: Reasons to be concerned

1. Impacts from automation have thus far impacted mostly blue-collar employment; the coming wave of innovation threatens to upend white-collar work as well.
2. Certain highly-skilled workers will succeed wildly in this new environment—but far more may be displaced into lower paying service industry jobs at best, or permanent unemployment at worst.
3. Our educational system is not adequately preparing us for work of the future, and our political and economic institutions are poorly equipped to handle these hard choices.

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[8] "The Future of Employment: How Susceptible Are Jobs to Computerisation?" Carl Benedikt Frey and Michael A. Osborne, Programme on the Impacts of Future Technology, University of Oxford, September 17, 2013, http://arche.depotoi.re/autoblogs/wwwinternetactunet_8a3fe3331e0ad7327e18d9fe6ec3f0ad04dcea58/media/3722fa7d.The_Future_of_Employment.pdf.

[9] "AI, Robotics, and the Future of Jobs," Aaron Smith and Janna Anderson, Pew Internet, August, 2014, http://www.pewinternet.org/2014/08/06/future-of-jobs/.

Key themes: Reasons to be hopeful

1. Advances in technology may displace certain types of work, but historically they have been a net creator of jobs.
2. We will adapt to these changes by inventing entirely new types of work, and by taking advantage of uniquely human capabilities.
3. Technology will free us from day-to-day drudgery, and allow us to define our relationship with "work" in a more positive and socially beneficial way.
4. Ultimately, we as a society control our own destiny through the choices we make.

What does the Regional Digital Economy Plan accomplish?

All twelve of Georgia's are developing Digital Economy plans with the support of the Georgia Technology Authority. The Regional Digital Economy Plan examines local and regional abilities to participate in the Digital Economy and identifies important resources, organizations, leaders, programs and investments that already exist, that can be leveraged in the future. The plans also identify each region's gaps in infrastructure, workforce and access to capital and align, prioritize and convert these gaps into actionable projects with goals that can be measured.

The planning process analyzes the Digital Economy capacity of each region in at least three distinct areas:

1. Workforce capabilities and needs
2. Supporting infrastructure and services for Internet connectivity
3. Access to capital to invest in each region's plans to increase participation in the Digital Economy

The most important value of these plans is to raise awareness, develop community and regional collaboration, prioritize objectives and establish plans to use our assets and strengths to be competitive. The key to success for any region in the future will be cooperatively working together to leverage opportunities and mitigate threats brought about by the ever-growing Digital Economy.

Is Northwest Georgia digitally ready?

Digital technology can be rather difficult to understand and even more difficult to effectively implement. Is Northwest Georgia ready? Do we have the knowledge, skills, and strategies necessary to make the most of digital technology? On one hand, educators, librarians, and policy-makers focus on the skill and knowledge people need for digital economy.[10] On the other hand, business leaders are investing a great deal of their time to ensuring that their organizations can compete in the digital economy.[11] Digital readiness provides a common starting point for individuals and organizations to approach the digital economy strategically. Digital readiness to

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[10] "A modern makeover for discussions on the digital divide," John B. Horrigan, February 14, 2014, Knight Blog: The blog of the John S. and James L. Knight Foundation, http://www.knightfoundation.org/blogs/knightblog/2014/2/14/modern-makeover-discussions-digital-divide/

[11] "Assess Your Digital Readiness" and "The Digital Imperative," Forrester, 2014, http://solutions.forrester.com/disruption and http://solutions.forrester.com/digital-assessment-test; "Digital Readiness Assessment Survey," PwC, PricewaterhouseCoopers International Limited, no date, http://www.pwcmobilemix.ca/dra/

focuses on what people *do* with digital technology, particularly in organizations, and what they *know* about the technology, as well as what digital technology they *have*: what it is, how to get it, and how to use it.

Technologists have a powerful way to understand digital readiness, is commonly called a "stack" (see figure 1). At the base of the stack are the concrete physical components: wires, plugs, etc. Resting on that are the connections via which information flows across the physical components. Above that are the software codes and data that flow across the connections, and then the practical functions of software, or applications. The skills and business processes that use the technology are at the top. Each layer depends on, yet is separate from, adjacent layers. In other words, the connection layer provides functionality via the physical layer and to the software layer, but exactly how it provides this functionality is quite open to the creative and practical needs of developers.

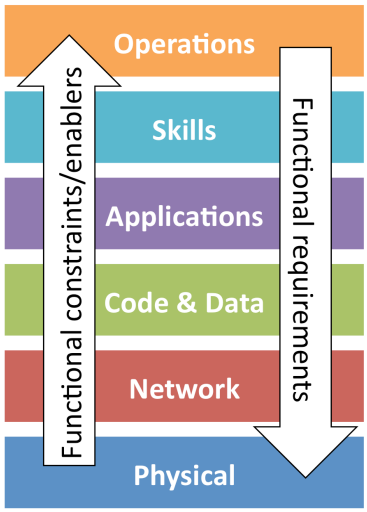


Figure 1. The "stack"

The lower layers constrain or enable what is possible for higher layers, and the upper layers' functionality determine the requirements for lower layers. The components of lower layers are concrete and tangible, and components get more abstract and intangible with each step up the stack. The functionality provided at each layer collectively determines the flexibility, reliability, security, etc., that is possible with the "solution" represented by the stack. A complete, functional system must have all layers. Every layer represents a cost and requires capital. The benefits of digital technology can only be realized when the stack is complete.

We used the stack to assess regional readiness for the digital economy because (a) it provides a ready-made, well-accepted ways of analyzing digital technology, and (b) it integrates well with regional economy planning and with other, more detailed and specific technology planning. Including important components that are outside technical standards—human skills and business operations—as shown in figure 1, enhances the stack's usefulness for planning. It provides a blueprint for investing in digital technology. The stack includes all the components necessary for success in the digital economy, and provides a great way to think about digital development strategies. The stack helped us realize that we have a very solid foundation but need to strengthen key parts of the upper layers in northwest Georgia.

What should we do?

Across northwest Georgia there is investment in digital technologies by all sectors. Computer hardware and network infrastructure are reasonably abundant and new. Many manufacturing companies are investing aggressively in enterprise resource planning (ERP) and industrial automation systems in order to compete and grow. There are some similar investments being made in the tourism sectors. Technology

spending in other sectors is largely either focused on cost saving by reducing use of facilities, labor, and materials. Or it is driven by government mandates. Local governments are especially challenged to demonstrate the value of digital technology to tax-averse voters. Relatively little is spent on technology-related professional development, support, and training.

Organizations of all kinds in northwest Georgia need better ways to make technology investments. They could do more to increase revenue and innovate, as well as reduce other costs, with digital technology. Northwest Georgia needs dedicated technology leadership, solid technology strategies, and practical knowledge about how to make the most of digital technology, particularly software. Therefore, the digital economy plan should be to generate greater return on technology investment by focusing on software and workforce. The Digital Region 1 plan is to (a) have manufacturing and other basic industries as driver that (b) builds and fosters investments in education and healthcare, (c) grows small business technology, and (d) supports more and better technology use by local governments and non-profit agencies.

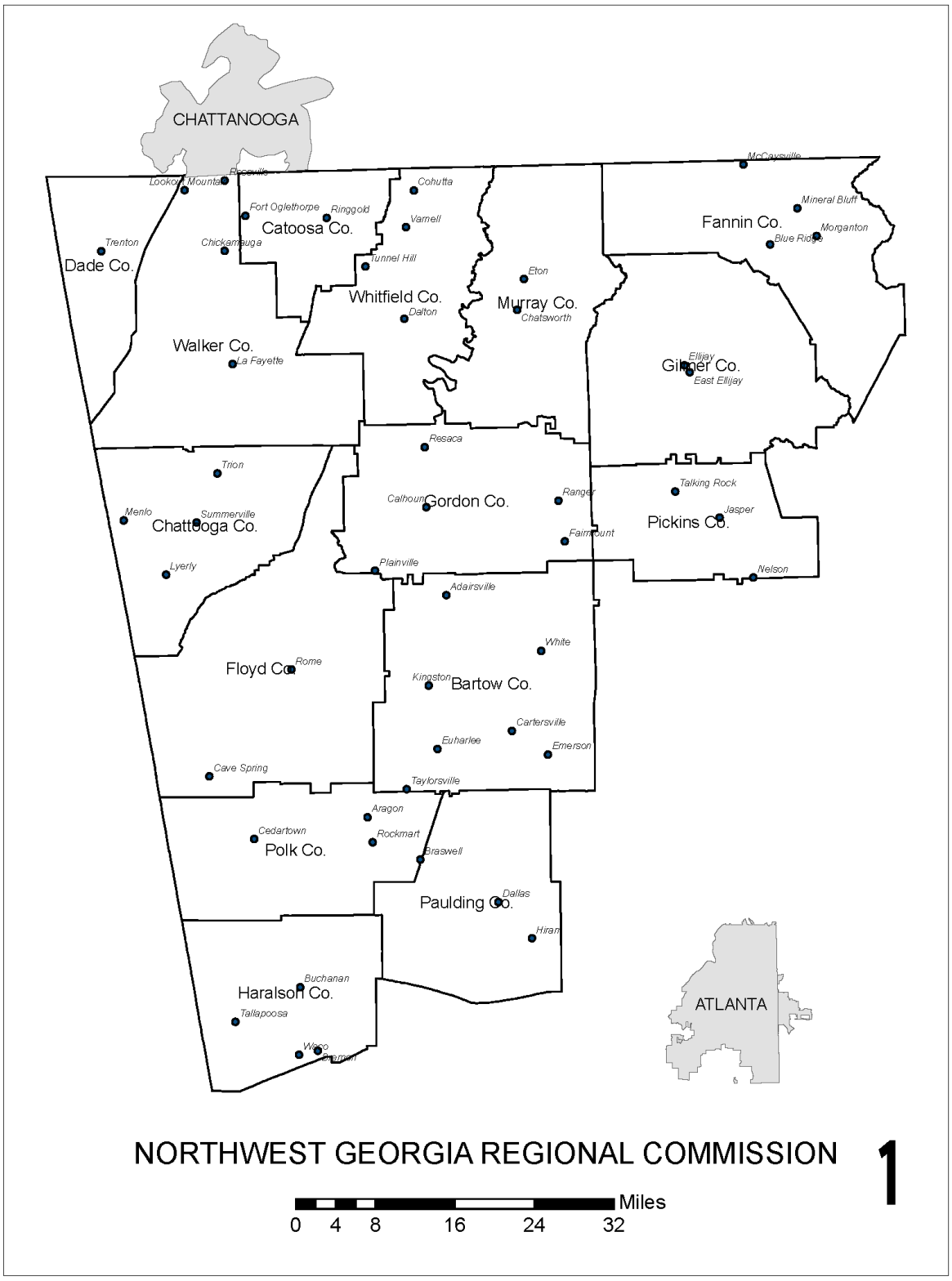


Figure 2. Cities and counties in northwest Georgia

Northwest Georgia: The Region Overview[12]

Conclusions

Northwest Georgia is geographically well positioned in the heart of the southeastern United States, between three growing metropolitan areas. The region is growing and recovering from the recent economic recession. The region has a diverse economy with a relatively strong manufacturing base. But employment and, more significantly, wages are relatively low. Much of the region's employment is in low-wage industries and occupations. Employment in high-wage occupations, particularly information technologies, lags behind other occupations in the region. And, growth and wages in these occupations is lower and slower than in other parts of the nation.

Northwest Georgia has abundant network infrastructure and services.[13] There are areas with limited service, even a few remote or rural areas with no coverage except satellite, but most population centers have two or even three different broadband service providers. The region also has excellent educational resources with extensive technical programs. The technical programs are at capacity they in spite of being less popular with students than non-technological vocational or purely academic programs.

These findings suggest that, in spite of having a solid technology base, the region is likely to have a difficult time developing and retaining persons with technology skills (particularly with robust demand for technology talent in adjacent metropolitan areas). IT occupations are likely less attractive than other occupations in the region, and those persons in IT occupations are likely to find better pay elsewhere. These findings also suggest that organizations in northwest Georgia are not getting good return on their investments in digital technology. If organizations were getting a lot of value from digital technology they would be more able and willing to pay more for technology talent.

- ***Workforce is abundant*** but under-educated and under-skilled for the digital economy
- ***Digital infrastructure and services are widely available***, with numerous service providers
- ***Access to capital is limited***, especially for intangible digital assets such as software, support, and training

Geography

Northwest Georgia is comprised of 15 counties and 49 municipalities. There are approximately 15,000 establishments in the region, 2% of which in the public sector. With Atlanta to the southeast and Chattanooga on the north, at the southern end of the Appalachia, between the Lookout Mountain and the Blue Ridge

[12] Unless otherwise noted data in this section is drawn from the Northwest Georgia Regional Population and Economic Assessment, which is included as an appendix.

[13] For detailed views of broadband availability in northwest Georgia, refer to Appendix 1, "Northwest Georgia Broadband Maps," and http://www.arcgis.com/home/webmap/viewer.html?webmap=a4f2860d135a46779474e0d7b9f8c1cc.

Mountains, the region is the geographic center of the southeastern United States. It is also economically central to the region.

Economy

Employment, establishments, and sectors

The region is relatively strong in goods producing sectors, with a relatively larger percentage of employees in manufacturing—24.8% verses 9.1% for the State of Georgia and 9.0% for the U.S.[14] Much of this is due to the strong presence of the floor covering industry, but northwest Georgia's manufacturing base extends far beyond that sector into areas such as automotive and medical devices. The region has relatively fewer employees in service sectors and similar levels of public sector employment. The region's manufacturers are relatively larger than their service sector peers. For example, there are over twice as many firms in retail trades than manufacturing, yet manufacturing employs twice as many people as retail.

Table 2. Sector size

Sector	*Total Emp.*	*Establish-ments*	*Avg. Emp.*
Manufacturing	60,034	1,148	52
Retail Trade	30,849	2,564	12
Health Care and Social Assistance	26,391	1,292	20
Education Services	24,526	433	57
Accommodation and Food Services	20,309	1,176	17
Public Administration	12,886	329	39
Transportation and Warehousing	11,145	565	20
Admin., Support, Waste Mgmt., Remed.	9,889	740	13
Wholesale Trade	9,482	983	10
Professional, Scientific & Technical Svc.	7,230	1,215	6
Construction	7,034	1,537	5
Other Services (except Public Admin.)	5,016	1,055	5
Finance and Insurance	4,687	748	6
Information	3,334	185	18
Arts, Entertainment, and Recreation	1,955	149	13
Real Estate and Rental and Leasing	1,781	525	3
Utilities	1,305	30	44
Management of Companies/Enterprises	1,000	58	17
Agriculture, Forestry, Fishing & Hunting	935	118	8
Mining	489	24	20
Total/Average	**240,277**	**14,874**	**19**

[14] For all goods producing sectors the percentages are: 28.4% for the region, 13.9% for the state, and 14.7% for the nation. See the *Regional Population and Economic Assessment*, page 12.

Source: U.S. Census Bureau, 2006-2010 American Community Survey

Income and wages

Wages in the region, particularly in manufacturing, are lower than wages in other regions of the state and all of Georgia. Generally, income and wages in the region have increased in the last decade, but the increase has been less than for Georgia overall. The median household income in northwest Georgia is around $45,000 per year, and is about $50,000 per year for all of Georgia. Well over half of the region's households earn under $50,000 per year. About a third of households earn between $50,000 and $100,000 a year. The percentage of households earning $100,000 or more has nearly doubled, but is still around 13%.

Table 3. Overview of Northwest Georgia income distribution

Annual Household Income	*2000*	*2006-2010*
Less than $50,000	64.4%	55.8%
Between $50,000 and $100,000	29.0%	31.3%
$100,000 or more	6.5%	12.9%

Source: U.S. Census Bureau, 2006-2010 American Community Survey

Table 4. Unemployment Rates, February 2014

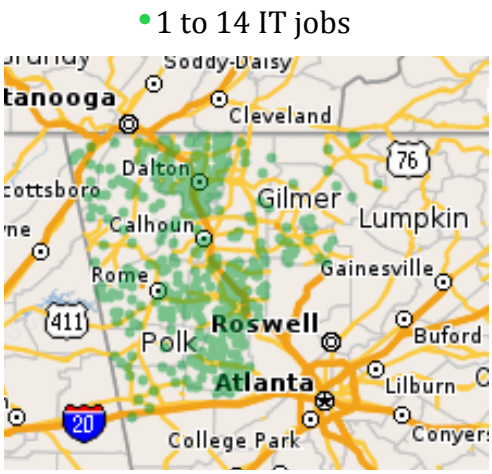
County	*Rate*
Average	**7.5**
Bartow County	7.3
Catoosa County	5.5
Chattooga County	9.0
Dade County	6.1
Fannin County	7.6
Floyd County	7.5
Gilmer County	7.5
Gordon County	7.8
Haralson County	8.0
Murray County	10.4
Paulding County	6.4
Pickens County	7.2
Polk County	7.5
Walker County	6.4
Whitfield County	8.5

Source: U.S. Dept. of Labor, Bureau of Labor Statistics

Occupations

The largest portion of persons in northwest Georgia is employed in management (27%), followed by sales (25%) and production (21%). Fifteen percent of the

region's employees are in service occupations, and 13% are in construction, maintenance, and natural resources. Employment is generally increasing, but unemployment in the region has been over 10% in recent years, and is currently averaging 7.5%.



Source: EMSI

Figure 3. Geographic distribution of IT jobs in northwest Georgia

There are approximately 5,000 persons employed in information technology occupations in northwest Georgia, and this is expected to increase to nearly 6,500 in the next decade.[15] The median income for these occupations is nearly $29 per hour or just under $60,000 per year. While this is lower than IT occupations elsewhere, it is on par with hourly earnings for all U.S. employees, comparable to the state, and well above the region's average incomes for the region. As shown in table 5 the region has a smaller share of these occupations than the rest of the nation, and IT occupations are growing slower in northwest Georgia than in the rest of the nation.

Table 5. Overview of IT occupations in northwest Georgia

5,097	*8.7%*	*$29.17/hr*
Jobs (2014)	**Change (2011-2021)**	**Median Earnings**
National Location Quotient: 0.50	Nation: 20.0%	Nation: $35.31/hr

Source: EMSI, http://www.economicmodeling.com

Education

The region has abundant educational resources, but relatively low educational achievement. Northwest Georgia has a higher proportion of persons with high school or less education than the rest of Georgia, and a lower proportion of persons with college education. At the same time, there are 22 public school districts, numerous private schools, multiple private colleges, three technical colleges, and two public four-year institutions. All school systems are implementing career pathways programs, many of which are technology-related—information technology, manufacturing, and STEM, are examples. And, all schools have access to the Georgia IT Academy, an online resource for including Microsoft Certification in courses. As mentioned above, the school systems all have extensive network infrastructure.

[15] Data in this paragraph were provided by Economic Modeling Specialists International (EMSI), http://www.economicmodeling.com.

While none of the colleges offer engineering degrees, several do have engineering "feeder" programs. Georgia Northwestern Technical College, which serves most of the region, offers numerous technology-oriented programs, is increasing its number of physical facilities, and has online classes. Chattahoochee, North Georgia, and West Georgia Technical Colleges, all of which also have extensive certificate and degree programs, serve parts of northwest Georgia. The colleges and universities in northwest Georgia have excellent network infrastructure.

Demographics

In comparison to the state and nation, the region has relatively small ethnic and racial minorities, and this mix has been reasonably stable.[16] The portion of the region's population made up of senior citizen age groups (65 years old and older) is going to increase, while the percentage of young people is decreasing. Northwest Georgia has more middle-aged citizens than old or young. A third of the region's population is of prime working ages: 25 to 55 years old. A key to the success of this plan is to engage this demographic in developing their technical skills because there a more of them, they need income to care for their elders as well as children, and successful parents and grandparents are possibly the best way to draw kids into technology-related fields.

Broadband infrastructure and services

The foundation of the digital economy is composed of networks that connect computers and similar devices. Networks carry the data, move the information, and connect agencies, businesses, people, and systems. Networks can operate via either wires, including various types of copper and fiber optic cables, or wireless. Broadband is high-speed, always on internet access that connects users to the global public Internet. Businesses, government agencies, households, etc., use broadband to connect to each other, and to network services like email and websites.

Types of networks

Most companies and government agencies of any size have local area networks (LAN) can only be accessed by authorized users and wide area networks (WAN) that interconnect their various locations. Every public school system and higher education institution in northwest Georgia has a private campus area network (CAN). Several cities in northwest Georgia, particularly Calhoun and Cartersville, have private metropolitan area networks (MAN). Private networks typically provide users with access to the internet, and some private networks operate over the public internet as virtual private networks (VPN). A network that connects other networks together and to the internet might be referred to as an access, backbone, backhaul, or middle mile network. These typically operate over optical fiber infrastructure. Appendix 1 contains a map of middle mile networks in northwest Georgia.

[16] See the *Regional Population and Economic Assessment*, page 5.

Types of broadband

There are several types of broadband, operating over different types of physical infrastructure, and numerous companies that provide broadband services. All telephone and cable TV companies in northwest Georgia provide broadband. Most broadband providers also provide telephone and television services. For example, Windstream is a telephone company that also provides backhaul and television services. Comcast is a cable television company but it also provides voice services. Several municipal utilities—most notably Dalton Utilities and Chattanooga's EPB—also provide broadband. Appendix 1 contains maps of broadband service by provider, speed, and technology type.[17]

There are several types of wireless broadband. A simple rule of thumb is that the reliability and speed of a wireless connection depends on how far away the antenna is and the number of antennas covering an area. Mobile telephone service is often coupled with wireless data via cellular technology. At the center of each cell is an antenna, and cells are built adjacent to each other, so a network of cell towers cover a whole area. Cellular service is typically purchased via a monthly fee from a company that provides access to the Internet and other network services. All mobile phone companies provide some type of cellular data service. Unfortunately, these companies do not provide coverage data so we have no maps for this type of service.

Satellite is similar to cellular except that the antenna is 23,000 miles up and it covers a large area. Essentially, all of northwest Georgia is covered by satellite service.

Wi-Fi is another wireless technology. Like cells, Wi-Fi coverage is provided by an antenna attached to an access point, which connects in turn to a LAN, MAN, or middle mile network. These access points can be connected together to form a "cloud" that covers an entire area. Many organizations, especially restaurants, provide publicly accessible Wi-Fi. Ringgold and Rome provide free public Wi-Fi in their downtown areas, and Cartersville is in the process of doing so.

Network service providers

Broadband and other network services are widely available in Northwest Georgia (practically everywhere except in the middle of the region's numerous forests). Indeed, the region arguably has the best broadband in the nation given its demographic, economic, and geographic characteristics. The region's does have some issues with the costs and speeds of broadband services, particularly in industrial parks, central business districts, tourism destinations, and rural areas. The region's network service providers include:

Backhaul/middle mile network operators

- Appalachian Valley Fiber Network/Parker FiberNet
- Georgia Public Web
- North Georgia Network

[17] Additional maps of broadband in Georgia are available online at http://digital.georgia.gov/map/mapgallery.aspx and http://www.arcgis.com/home/webmap/viewer.html?webmap=a4f2860d135a46779474e0d7b9f8c1cc.

- Sunesys
- SyncGlobal
- Windstream
- Zayo

Cable television system operators

- Charter
- Comcast

Cellular/mobile telephone service providers

- AT&T
- Cricket
- Sprint
- Straight Talk
- T-Mobile
- Trac Phone
- Verizon

Local exchange carriers (LECs, ILECs, or "telcos")

- AT&T
- Chickamauga Telephone Company
- Ellijay Telephone Company (ETC)
- Frontier Communications
- Ringgold Telephone Company (RTC)
- TDS Telecom
- Trenton Telephone Company/Tennessee Valley Net (TVN)
- Windstream

Municipal and other local access providers

- CALNET, City of Calhoun
- EPB Fiber Optics (City of Chattanooga)
- FiberCom, City of Cartersville
- iWispr
- OptiLink, Dalton Utilities

Wi-Fi (wireless Ethernet) downtowns

- Cartersville (pending)
- Ringgold
- Rome

In some areas, electric membership cooperatives (EMC) are providing telecommunications services. While none of the EMCs that serve northwest Georgia offer network services, the EMCs could be important partners:

- Amicalola EMC
- Carroll EMC
- Cobb EMC
- GreyStone Power Corporation

- North Georgia EMC
- Tri-State EMC

The Digital Region 1 plan

The purpose of this plan is to attract investment, grow businesses, increase prosperity, and support institutions with digital technology in northwest Georgia. The overall goal is to increase the benefits of and revenue from using digital technology. The plan has three strategies, each supported by several tactics. While the strategies each move toward the goal of growing the region's digital economy, each tactic is intended to increase:

- Technology investment and use by organizations
- The number and sizes of the region's technology companies
- The number of technology jobs and occupations
- Income & wages for digital leadership and workforce skills[18]

Each of these will be incorporated into any tactic as metrics to measure the tactic's impacts. The strategies will focus on key sectors as catalysts for digital development. In other words, the plan focuses on achieving the objectives in certain sectors in order to drive digital development in other sectors. The targeted sectors for this plan are:

- Education
- Healthcare
- Local government
- Manufacturing
- Tourism
- Small business

It is impractical to implement the plan across the entire region, especially since the Regional Commission has limited resources. So the plan is to pilot the tactics in counties that participated most in the planning process, then replicate the tactics in other counties. Also, the plan is to focus on basic industries—particularly manufacturing and tourism—for maximum economic impacts. Work with and through local cross-sector organizations such as chambers of commerce and development authorities.

Build on and support the work of enthusiasts, entrepreneurs, single-sector organizations, and technology affinity groups. This capitalizes on enthusiasm for digital technologies and existing organizations. Leverage the Investing in Manufacturing Community Partnerships program and similar programs. Work out any issues with the tactics and demonstrate success before rolling the tactics out to other counties.

Strategy 1: Develop resources to promote & support digital development

Digital development requires vision, strategy, and resources. Vision guides development by identifying what could be, a better possible situation. Strategy is

[18] While income and earnings generally follow skills, research shows that pay for information technology professions in northwest Georgia lag behind the rest of the state and nation. Thus the region runs the risk of "brain drain" and/or weak return on investments in technology education and training.

simply how resources will be allocated and deployed to achieve the vision. Then, of course, resources are necessary to execute the strategy.

Tactic 1.a: Establish a team of technology champions from leading organizations in target sectors to share their expertise and promote digital technology

A fundamental challenge to digital development is simple lack of awareness of digital technologies and how they are used to improve organizational performance. Northwest Georgia has some very strong technology leaders who can express a powerful vision for using digital technology. But, they are focused on their organizations and industries. The opportunity for northwest Georgia is to engage these individuals to promote digital technology by sharing their insights and stories. This tactic is also a way to recognize the region's technology leaders and for them to expand their knowledge and skills. It will be necessary to create or identify opportunities for technology champions to advise others and promote technology. Cross-sector and sector-focused organizations should be approached about having technology champions address their members. Most of the tactics under strategy 2 are opportunities for technology leaders to promote digital technology.

1. Identify and recruit technology leaders from targeted sectors
2. Review the DR1 plan with these leaders, focusing on strategy 2, and incorporate their feedback into the plan
3. Promote the technology champions as speakers, and coordinate and support these appearances
4. Tap technology champions for tactics in strategy 2

The technology champions will also guide and support the Regional Commission as it implements the Digital Region 1 plan. While the technology champions will have every opportunity to participate in other tactics, they will not be expected to take responsibility for doing the work.

Tactic 1.b: Develop a technology financing program, leveraging commercial lenders and economic development agencies

Lack of fiscal capacity and financing options is a major barrier to investment in digital technologies, especially for small businesses and non-profit agencies. Financing technology can be difficult because:

- Many technology investments are relatively small compared to capital investments
- Technology assets have high depreciation rates
- Financiers are used to real and securable assets, and don't have a good way to deal intangible or virtual assets
- Public programs often require projects to result in job creation, and technology projects often reduce labor and increase skill requirements

The challenge is to finance software and other intangible or virtual assets to boost competitiveness, productivity, or revenue. Digital technology investments often result in job upskilling and increased wages, if not new jobs. So, education and

training should be allowable uses of technology financing, and worker income should be used as a metric along with or in place of jobs created.

It will be necessary to identify the various sources of funds and how they fit with these objectives. It may be necessary to work with policy-makers to modify existing programs or create new ones. Some technology companies have financing or deferred payment options, which should be investigated as part of this tactic. There are financial resources available through commercial lenders and a number of economic development agencies. A first step might be to identify technology projects that need funding, particularly ones that involve software and training.

1. Identify technology projects that are stymied by lack of funds
2. Identify various sources of financing:
    a. Commercial lenders
    b. Economic development agencies/authorities
    c. Technology companies
    d. Other sources: Leasing, receivables financing/factoring
3. Assess fit with characteristics of technology investments
4. Develop a financing program internally (with revolving loan funds, for example) as necessary or practical
5. Catalog financing options and promote via other strategies & tactics
6. Recommend policy changes if appropriate

Potential funding resources

There are many ways to fund technology projects. The new approach is "crowdfunding," which involves requesting financial contributions from numerous, usually small private funders. Kickstarter is the most known crowdfunding system, but there are many others. TechBridge, an Atlanta non-profit that helps other non-profits with technology, "offers nonprofits a new funding mechanism for technology projects," called the Nonprofit Exchange.[19] Georgia recently changed its financial regulations to allow small private investments from uncertified investors. At least one company, SparkMarket[20], has started up to assist with this type of financing. CrowdFiber "is an online marketplace where service providers, local governments, utilities, community organizations, interested citizens, consumers and businesses can organize around the goal of building, investing in and sustaining Gigabit communities."[21] Several crowdfunding focus on technology projects, such as TechnoFunding and TechMoola[22].

Local and regional development authorities have fiscal capacity that could be tapped for digital development, but this is somewhat unprecedented.[23] Commercial lending and debt financing are the traditional paths, but the supply of that money is tight

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[19] TechBridge Nonprofit Exchange website, https://nonprofit-exchange.techbridge.org/

[20] See the SparkMarket website, https://www.sparkmarket.com/

[21] CrowdFiber website, http://www.crowdfiber.com/whatis

[22] The websites are https://www.technofunding.com/index.php, http://www.techmoola.com/

[23] There is one regional technology authority in Georgia—The South Georgia Regional Technology Authority (http://www.sgrita.org/)—and several development authorities have invested it telecommunications infrastructure, so it's not *totally* unprecedented.

and has stringent requirements of borrowers. Several federal agencies provide funds to supplement, reduce risk for, or, where it is not practical, replace commercial financing.

The *Appalachian Regional Commission (ARC)* primarily does grants-making for public and non-profits organizations. It is all about job creation and job growth, and is interested in how broadband benefits other sectors, education, government, etc. ARC is also very into workforce development and job retention. ARC does software all the time, and upgrades are absolutely allowable. For example, ARC funds non-profit hospitals' technology like EMR and health information exchanges to help them get better healthcare reimbursements rates. ARC does a lot of training funding, usually through community colleges and workforce centers working with private sector employers to help people transition careers or get young people into needed positions. ARC could fund equipment and program development.

ARC dollars are at the discretion of the state. The governors' offices of the states determine what projects to fund in ARC counties. Funds go to a very wide array of projects: Education, healthcare, tourism, broadband, entrepreneurship, water & sewer, business development, etc. ARC is bottoms-up oriented so local governments, for example, would have to recognize they have a deficiency or a need, and would approach state to get funding. ARC provides technical assistance as well, connecting with similar entities that have put resources in the technology. EDA often partners with EDA and other agencies: ARC's statute allows it to exceed 80% in partnership with other Federal agencies.

The *Georgia Department of Community Affairs (DCA)* has multiple financing programs, most of which are focused on facilities and infrastructure. The Georgia State Small Business Credit Initiative provides several ways to increase capital or reduce risk for lenders, including Community Development Financial Institutions (CDFI). *The OneGeorgia Authority* offers similar programs that capitalize on Georgia's Master Tobacco Settlement.

Digital development is the kind of thing the *U.S. Economic Development Administration (EDA)* likes to see. EDA cannot directly assist any business or individual. All funds have to go through a non-profit entity and must be tied to job creation or private investment. EDA funds are generally used for projects with budgets over $100,000, but there is some flexibility with non-profit fiscal agent and for-profit commercial lender participation. EDA's programs are set up to fit the regions, like northwest Georgia. The only real EDA restrictions are that interest rates can't go below 4 points below prime or 4%, and the borrower has to be an eligible entity. EDA prefers funding real assets. A strong project will have commitment letter from companies looking permanent employees rather than temporary help and wanting to stay and grow in the region.

The *U.S. Small Business Administration (SBA)* provides a variety of options for small business financing, including guaranteeing loans and finding venture capital. SBA sets guidelines for partner institutions—commercial lenders, community development organizations, and microlenders—to make loans the SBA will

guarantee, reducing risk for lenders. There are multiple qualifying characteristics, including lack of access to other financing on reasonable terms, for SBA guaranteed loans. Specifically, for the General Small Business Loan program (which SBA refers to as 7(a)), borrowers must "Be able to demonstrate a need for the loan proceeds" and "Use the funds for a sound business purpose."[24] SBA's other loan programs are a Microloan program, which is for small, short-term loans, and major Real Estate and Equipment loans (which SBA refers to as CDC/504) for large capital investments. The SBA also provides funds to match private investments via special Small Business Investment Companies (SBIC), which then provide equity and debt financing for small businesses. None of these programs are specifically for technology, and it is unclear whether software and services would be allowable uses. CDC/504 loans in particular, although for equipment, would not be appropriate for most technology investments.

Access to Capital for Entrepreneurs (ACE) provides SBA Microloans and provides financing using EDA and DCA resources. The *North Georgia Certified Development Company*, which is administered and staffed by the Regional Commission, also provides SBA financing. *Georgia Small Business Development Centers (SBDC)* do not directly provide financing, but do provide a variety of consulting services to help small businesses to get ready for financing. ACE also provides advisory services to its borrowers. None of these services focus on digital technology.

Broadband-related funding programs

There are numerous public programs to provide education, healthcare, libraries, persons living in poverty, public safety, and rural areas with broadband and related technologies[25]:

- The *White House's ConnectED initiative*[26] will, within five years, connect 99 percent of America's students to next-generation broadband and high-speed wireless in their schools and libraries. The Federal Communications Commission (FCC) and companies like Apple, Microsoft, Sprint, and Verizon are already providing their support, collectively pledging to connect more than 20 million more students over the next two years. ConnectED will also provide better broadband access for students in rural areas, by expanding successful efforts to connect parts of the country that typically have trouble attracting investment in broadband infrastructure. ConnectED invests in improving the skills of teachers, ensuring that every educator in America receives support and training in using education technology tools that can improve student learning. ConnectED will also lead to new resources for teachers from any school to open their classrooms to interactive demonstrations and lessons from world-renowned experts, and to collaborate with other educators worldwide.

[24] From http://www.sba.gov/content/7a-loan-program-eligibility

[25] Few of these programs provide funding for software or training. Some can support private sector investment in public infrastructure but none provide funds for internal enterprise projects.

[26] From http://www.whitehouse.gov/issues/education/k-12/connected

- The *State of Georgia Governor's Office of Student Achievement's Connections for Classrooms*[27] is a grant program joining multiple state agencies around the common goal of ensuring Georgia schools and classrooms have the high-speed broadband access required for digital and blended learning. The effort includes expanding the University System of Georgia's (USG) PeachNet network to connect every Georgia local educational agency (LEA) to its high-speed network. The partnership between USG and GaDOE will ensure that all district central offices have 100 megabits per second per school of bandwidth by July 2015.
- *Connect2Compete* is a program of *EveryoneOn*[28], national nonprofit working to eliminate the digital divide by making high-speed, low-cost Internet service and computers, and free digital literacy courses accessible to all unconnected Americans. Through partnerships with local Internet service providers, EveryoneOn is able to offer free or $9.95 home Internet service in 49 states. It works with device refurbishers for individuals and their families to purchase discounted devices.
- The *Federal Communications Commission*[29] has adopted comprehensive reforms of its Universal Service Fund (USF) and Intercarrier Compensation (ICC) systems to accelerate broadband build-out to the 18 million (in 2011) Americans living in rural areas who currently have no access to robust broadband infrastructure. This reform will expand the benefits of high-speed Internet to millions of consumers in every part of the country by transforming the existing USF into a new *Connect America Fund* (CAF) focused on broadband.
- *FirstNet*[30] is an independent government authority with a mandate to provide specialized communication services for public safety. It is establishing a nationwide, interoperable public safety broadband network dedicated for first responders. Using nationwide 700 MHz spectrum, FirstNet will put an end to decades-long interoperability and communications challenges and help keep our communities and emergency responders safer.
- *Universal Service Administrative Company*[31] helps ensure access to affordable telecommunications for communities across the country. It provides support for telecommunications companies with customers in rural, hard-to-serve areas, discounts on basic, local telephone service for low-income individuals, reduced rates for telecom and internet services for rural health care providers, and discounts on telecom and internet connections to eligible schools and libraries.
- *USDA Rural Utility Services Telecommunications Programs*[32] provide funding opportunities in the form of payments, grants, loans, and loan guarantees, for the development and commercialization of vital utility services, including telecommunications. *Farm Bill Broadband Program* is designed to provide loans

[27] From http://gosa.georgia.gov/connections-classrooms-grant-program
[28] From http://everyoneon.org/about/
[29] From http://www.fcc.gov/encyclopedia/connecting-america
[30] From http://www.firstnet.gov/about.
[31] From http://www.usac.org/default.aspx
[32] From http://www.rurdev.usda.gov/RUSTelecomPrograms.html

for funding, on a technology neutral basis, for the costs of construction, improvement, and acquisition of facilities and equipment to provide broadband service to eligible rural communities. The *Community Connect* program serves rural communities where broadband service is least likely to be available, but where it can make a tremendous difference in the quality of life for citizens. The projects funded by these grants will help rural residents tap into the enormous potential of the Internet. The *Distance Learning and Telemedicine* (DLT) Grant Program is specifically designed to assist rural communities in acquiring distance learning and telemedical technologies so that local teachers and medical service providers who serve rural residents can establish interactive video conferencing links to teachers, medical professionals, and other needed expertise located at distances too far to access otherwise. The *Telecommunications Infrastructure Loan Program* makes Long-term direct and guaranteed loans to qualified organizations for the purpose of financing the improvement, expansion, construction, acquisition, and operation of telephone lines, facilities, or systems to furnish and improve Telecommunications service in rural areas. All facilities financed must be capable of supporting broadband services.

Tactic 1.c: Provide a digital strategy template/tool for organizations based on information technology best practices and standards

Many top decision-makers do not know what a digital technology strategy is, let alone how to create one, so many organizations do not have one. This is particularly true for local governments and non-profit organizations. Part of the challenge to effective acquisition and use of digital technologies is lack technological of standards—formal and informal. Standards and strategies enable economical and effective use digital technology.

Essentially, a digital strategy is a way to achieve organizational goals by using digital technology. It is a plan to move from the current state to a better, more desirable state based on digital technology. Such a strategy specifies changes in activities and assets, how those changes will be made, and how any problems will be addressed. A digital strategy also provides a basis for information sharing and standardization among organizations and between sectors to better use technology at lower costs.

1. Develop or select a digital strategy framework
2. Incorporate best practices
3. Build a template/tool with framework and practices
4. Organize sector teams to develop, review, and share strategies
5. Conduct workshops and provide support for creating and implementing digital strategies, particularly for local governments, non-profit agencies, and small businesses (see tactic 2.a)

Frameworks for digital strategies

Four types of strategic frameworks are the Information Technology Infrastructure Library (ITIL), Gartner's pace-layering approach, the Agile methodology, and open source. Digital readiness is essentially ability to implement these kind of strategies.

ITIL[33] is focused on standard practices for IT service management, for making sure information systems consistently perform as expected. It is also a lexicon or set of well-defined concepts for this purpose. ITIL starts with organizational objectives and requirements. It provides structure for translating those requirements into service designs, transitioning to the new services, managing IT service operations, and improving performance. ITIL puts a heavy emphasis on measurement and control. It was created and is most widely used in very large organizations, and can be difficult to adapt to smaller organizations, which includes almost all organizations in northwest Georgia. Regardless, the concepts and practices in ITIL are effective for ensuring that information systems are effective and reliable.

Gartner's pace-layering[34] takes a very different approach, focused on applications. Pace-layering is intended to resolve the tension between using IT to tap new business opportunities and the imperative to control costs while achieving business objectives. Pace-layering categorizes applications' functions in terms of their general function and rate of change. "Systems of record" manage essential data for an organization, including processing transactions. Accounting exemplifies a system of record. These are common to most all organizations and have long lifecycles. Applications that provide functions unique to an organization or industry are referred to as "systems of differentiation," which have medium lifecycles. Short lifecycle applications meant to capitalize on specific opportunities or explore new markets are referred to as "systems of innovation." The utility of this approach is that allows for different yet connected strategies for each type of system.

Agile is more of an approach, methodology, or even philosophy for development, than it is a strategic framework, similar to Lean for manufacturing. The core idea of the Agile is to develop software (or most any user-facing information system) via multiple short by intense cycles, or sprints. This contrasts with the traditional "waterfall" approach of gathering requirements, planning the project, building the software/system, and then rolling it out. Agile involves multiple small, self-organizing, cross-functional teams, called "scrums," rather than a few single-function groups (application developers and database administrators, for example). Agile delivers better products faster than the traditional approach, especially when requirements are uncertain, technology is changing, and people are willing to work together without supervision.

Open source refers to software for which the source code is freely available. It is written collaboratively by programmers, so anyone can contribute but all contributions are open to review (and criticism) by any. Major corporations and government agencies use open source software extensively, particularly for websites but also for key enterprise applications. Even leading technology companies like IBM have incorporated open source into their core business

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[33] ITIL.org; "What is ITIL®?" ITIL, http://www.itil-officialsite.com/AboutITIL/WhatisITIL.aspx; "Information Technology Infrastructure Library," Wikipedia, http://en.wikipedia.org/wiki/Information_Technology_Infrastructure_Library

[34] "Pace-Layered Application Strategies, Fact or Fiction?" Adrian Bridgwater, Dr. Dobb's Journal, February 17, 2012, http://www.drdobbs.com/architecture-and-design/pace-layered-application-strategies-fact/232601066; "Accelerating Innovation by Adopting a Pace-Layered Application Strategy," Yvonne Genovese, Gartner, January 9, 2012, https://www.gartner.com/doc/1890915/accelerating-innovation-adopting-pacelayered-application

offerings. While open source is available free of charge, it requires significant expertise to install, configure, and operate it; which is how tech companies make their money from open source, by charging for professional services.

Open source has come to have the broader implication of any work that is done in a manner that is intended for others to copy and adapt to their own needs. The open approach has been applied to everything from automobiles to education to innovation.[35] Indeed, "open" has become something of a fundamental approach. In particular, this approach is being applied to making government data readily available. For examples, https://www.data.gov/open-gov/ is a portal to government data sets and https://chattanooga.demo.socrata.com/ provides data from a wide range of public agencies in Chattanooga, Tennessee.

Best practices for digital technology

As with strategic frameworks, there is a wide range of best practices for digital technologies. ITIL is essentially a compilation of best practices. Some best practices are very generic, such as "align IT spending with organizational objectives" or even just "have a strategy." Other best practices are specific to sectors or types of organizations. A best practice that bridges these two areas is "transform with technology." Implement digital technology along with changes in processes and even products. Generally, these changes are becoming more customer-focused, decentralized, and lean. Use technology to enable these changes.

The US Government Accountability Office[36] looked at best practices for acquiring information technology. These included active engagement with program stakeholders, knowledge and skills of the program staff, support from executives, and having the end users test and validate the system components. Note that several of these are issues or objectives for those who contributed to the DR1 plan. Carnegie Mellon University suggests another general best practice: Assess software and systems in terms of their level of maturity.[37] This can be applied to acquiring and developing new technologies and services, or even to an organization's processes. An even more general best practice is continuous improvement via iterative general processes such as "plan, do, check, act."[38]

Best practices for technologies are presented as particular applications or functions. For example Public CIO[39] magazine identifies best practices for crowdsourcing, mobile applications, relationship management, self-service websites, and social media. In contrast, the Center for Digital Government[40] anchors its best practices on

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[35] Specific examples are Local Motors (https://localmotors.com/), the Open Education Database (http://oedb.org/), and InnoCentive (https://www.innocentive.com/).

[36] "Information Technology: Leveraging Best Practices to Help Ensure Successful Major Acquisitions," GAO-14-183T, U.S. Government Accountability Office, Nov 13, 2013, http://www.gao.gov/products/GAO-14-183T

[37] "Capability Maturity Model Integration," Wikipedia, http://en.wikipedia.org/wiki/Capability_Maturity_Model_Integration

[38] "Continuous Improvement," American Society for Quality, http://asq.org/learn-about-quality/continuous-improvement/overview/overview.html

[39] "Next-Generation Government," Public CIO Special Report, eRepublic, 2014, http://www.govtech.com/pcio/special_reports/Next-Generation-Government-2014-Q1.html

[40] "Digital Cities & Digital Counties Survey: Best Practices Quick Reference Guide," Center for Digital Government, eRepublic, 2014, http://www.digitalcommunities.com/library/papers/254777391.html

citizen engagement and considers how technology enables this for government operations, policies and plans, public safety, sustainability, and technology infrastructure. In general, Agile is cost-effective approach to apply digital technologies, ITIL is a comprehensive framework for managing digital systems, and pace-layering is analytical tool for differentiating types of digital systems, all of which enable better use of digital technology for top-line growth.

Information technology standards

Computing, networking, and all other aspects of the digital economy are built on standards. A standard is simply a clearly defined way of doing things. IT standards specify functional, physical, and virtual characteristics of digital technologies. The Internet, for example, operates because of the Internet Protocol standards. Anyone who wants to be part of the Internet just has to implement those standards. Standards make technology less expensive and ensure that different types of technology work together.

The key to standards is consensus on what's going to be used and how it's going to be used. This can be applied at any level to any type technology. For example, there are standards for geographic data, to make it easy to share data between systems. But different organizations can extend this by standardizing on particular software, data stores, or even contractors. More broadly, similar organizations—local government agencies, for example—can standardize on practices, which is exactly what strategies and best practices are help with.

Tactic 1.d: Brand and market Digital Region 1

Digital Region 1 is essentially a brand that northwest Georgia can use to attract and promote technology investment. It is necessary to grow from within by improving skills and innovating, but it is also necessary to attract and retain industry and talent. Northwest Georgia has wonderful assets and great location, which need to be promoted as well as capitalized in a coherent, methodical manner. The purpose of the DR1 brand is to encourage increased use of digital technology by individuals and organizations in the region, as well as to bring more tech-savvy businesses and people to the region.

The brand will focus on how digital technology is being used to fuel growth and improvement, particularly in the targeted sectors. It will also showcase the region's geography, industry, and natural resources, and how digital technology enhances these assets. In order to do this effectively, the Regional Commission will engage local and sector leaders to identify key assets and provide case studies. The Regional Commission will launch an interactive website to share this information with the world, and to coordinate and promote implementation of this plan.

1. Identify key internal and external audience, and desired actions by audience members
2. Design brand elements for audiences and actions
3. Set criteria for use of DR1 brand and for being designated as part of DR1

4. Gather information about assets and for case studies to be showcased with the brand, and establish a process for keeping this information fresh and updated
5. Develop a DR1 website to parallel the Northwest Georgia Regional Commission website
6. Launch a digital marketing campaign incorporating other DR1 strategies and tactics, using social media and the DR1 website

Tactic 1.e: Assess demand for and supply of digital skills, particularly for industrial automation and web sites, via events to promote technical occupations

Data gathered for this plan show low overall demand for and supply of digital skills. Anecdotal evidence suggests that (a) job seekers and students are more interested non-technical occupations, (b) demand for technicians is strong and likely to increase, and (c) there are critical needs for persons with deep technology skills who can function in operational (e.g., on the manufacturing shop floor and in clinical settings) areas. In addition, it seems that many people have effectively dropped out of the workforce or are doing work for which they are over-qualified.

All of this suggests a major disconnect between workforce demand and supply. This conclusion that is bolstered by the fact that it is nearly impossible to get detailed information about what individuals can do with technology or what organizations need their employees to do with technology. Empirical research (i.e., statistically valid surveys) is expensive and has limited practical value. DR1 needs a practical way to promote technical occupations—to encourage more people to develop their digital skills and pursue technology-intensive jobs—that also gathers information about what employers need and what folks can do.

1. Reach out to major employers, educational institutions, and technology companies (stakeholders) to identify critical and emerging needs for technology talent
2. Gather data from employers about the amounts and types of skills needed
3. Develop a campaign to celebrate this work, inform people about it, and promote ways people can prepare for it
4. Engage news media and use social media to promote the campaign
5. Conduct events in conjunction with stakeholders targeting young adults, mid-career professionals, and families
6. Gather data about current capabilities and goals from participants

Strategy 2: Explore and learn about digital technology for top-line growth

Digital technologies are diverse, tend to be complicated, and are constantly evolving. This truism applies to the technologies' functions as well as the technologies. In order to succeed with digital technologies and incorporate them into organizational processes leaders and workers have to be constantly exploring and learning. It can't be left to the technologists. The technologists are inevitably biased toward what they feel most comfortable with or what they think is cool. Technologists may not grasp the implications of technological functions: How individuals might really use the technology and the organization might transform itself with it. In order to lead

organizations, top officials need to be familiar with the technologies used to operate those organizations. In order to be productive, workers must be constantly upgrading their skills. Leaders, workers, and technologists need to learn together about best practices—such as digital readiness, open source, Agile, ITIL, and pace-layering—standards, and strategy.

Tactic 2.a: Conduct "Grow Digital" programs for small businesses, non-profits, and government agencies

Small organizations, particularly those that do not have family connections to technologists, just don't have the capacity to figure out how to get and use digital technologies. The *Grow Digital* program would be an opportunity for existing or new enterprise to leap forward technologically. The key to doing this effectively is to think like an entrepreneur: How can targeted investment in technology allow me to radically improve my product/service or reach an underserved market? While the program will focus on small for-profit businesses, it will be open to any non-profit or even public agency that is willing to think entrepreneurially about digital technology.

1. Review available programs for *Grow Digital*, and develop a new program or license an existing program as appropriate
2. Engage local cross-sector organizations that have demonstrated interest in assisting small businesses to host and promote the first round of *Grow Digital* programs
3. Involve technology champions and recruit other business leaders to act as mentors for *Grow Digital* programs
4. Conduct an initial round *Grow Digital* in one to five communities
5. Analyze and review the efficacy of the initial round, modify as appropriate, and conduct a second round with additional communities

For the most cost-effective impact Grow Digital should use local facilitators and mentors, build working relationships across sectors, and connect to world-class technology solutions. The goal is to create a learning community to support acquisition and use of digital technology. This approach fits well in the DR1 plan because it builds on technology champions (tactic 1.a), technology financing (tactic 1.b), and best practice based digital strategy (tactic 1.c).

Examples include Delaware's Digital Compass, the Vermont Digital Economy Project, and Oakland Digital's Digital Equity program.[41] It may be best to license a program like this, such as Co.Starters[42], and adapt it to focus on digital technology. Or, build a longer format collaborative program from programs like Google's Get Your Business Online[43], which is a one-day instructor-led workshop. Perdue University' IN-MaC[44] program facilitates technology adoption manufacturers, but an approach that

[41] See http://dsbtdc.org/special-programs/, http://www.vtsbdc.org/programs/Vermont-Digital-Economy-Project, and http://odalc.org/ for more about these programs.

[42] See http://costarters.co/.

[43] See http://www.gybo.com/georgia/.

[44] See http://www.purdue.edu/in-mac/index.php.

engages other sectors will be more practical and have greater impact. IN-MaC also has a workforce component, which makes a lot of sense for northwest Georgia.

Tactic 2.b: Convene a few large conferences about how to make the most of digital technology

The Regional Commission will work with internal and external regional stakeholders to convene one or two large conferences per year. The purpose of these conferences will be to promote investment in new digital technologies by showcasing world-class uses. These conferences will address at least one of the targeted sectors, with the goal of identifying issues and opportunities that are common to multiple sectors. Ideally, this will involve building DR1 content into conferences run by stakeholders, such as the Greater Rome Chamber of Commerce's *Confluence* conference, rather than organizing conferences independently. A critical element for this tactic and tactic 2.c is active involvement of technology companies.

1. Identify planned conferences that might benefit from and fit with DR1 content
2. Set dates and locations as necessary for conferences, develop budgets for conferences, and establish sponsorship levels to cover costs
3. Engage technology champions, technology companies, and other stakeholders to plan content
4. Promote, manage logistics, conduct, and then evaluate the conferences

Tactic 2.c: Conduct multiple small hands-on workshops highlighting particular technologies to engage and inform leaders and workers

The small workshops will be fun events for most anyone, focused on particular digital technology applications. The purpose is as much to celebrate the work and workers as to showcase the technology and its impact. We anticipate that these will feature technology companies. The challenge is to have them do these as informational programs rather than sales pitches. We will deal with this by focusing on a particular organization in northwest Georgia that has implemented an application, or a technologist who is an expert with the technology. The workshops will be conducted as in-person events in communities that have demonstrated interest, but should also be offered online as a "webinar."

1. Reach out to communities and tech companies to host, identify topics for, and participate in workshops
2. Identify existing content and programs, such as Small Business Administration seminars and Google's Get Your Business Online, that might be built on or incorporated into workshops
3. Recruit technology users—either organizations or particular individuals—to anchor the workshop
4. Recruit technology companies to sponsor the workshops
5. Work out how tech companies' participation in workshops fits with conference sponsorships
6. Schedule, conduct, and evaluate workshops

There are many examples of this type of program. The Mozilla Foundation's *Maker Party*[45] is a great general model, although it primarily focused on young people. NetSquared has some interesting programs that are very open, grassroots, and low-cost, such *Social Media Surgery*.[46] These are intended for non-profits but could be easily adapted to other types of organizations and individuals. Google's *Get Your Business Online*, mentioned above, is an excellent example of this type of workshop.

Tactic 2.d: Offer "externships" for students and job-seekers to explore tech occupations by helping others use digital technology

Educational institutions generally do a wonderful job introducing students to technology and using digital technologies. But, their capacity is limited and a lot is expected of them, their use is constrained by regulatory imperatives, and some of the best learning about digital technology happens when individuals help others to use it. While classroom, school-based learning is critical, applied learning makes the knowledge real and gives participants marketable experiences and skills. Externships allow individuals to build supportive relationships with technology professionals and get some basic experience. Externships need to be both flexible and fun, and the best way to do this is to structure them as challenges, contests, or games.

There is no shortage of opportunities: Many individuals and organizations need "hand-holding" to get started with and effectively use digital technology. For example, healthcare providers are mandated to get patients to access health information via online portals. This could greatly benefit the patients, but the patients need a lot of personalized assistance to get started. Externships could also operate through DR1 conferences, demonstration projects, maker spaces, network investments, workshops, and other tactics. So, this tactic addresses two critical needs: The need for applied, experiential learning about digital technology and the need for close support to begin or improve use of digital technology.

1. Engage cross-sector and sector focused organizations to identify externship opportunities
2. Work with educational institutions to align externships with courses and programs
3. Develop a system for identifying externship participants, signing up externs, and structuring and tracking their activities (i.e., set up the challenge, contest, or game)
4. Work with organizations to establish locations, resources, and times for externship activities, as well as providing externs with some orientation

Externs will also be engaged to assist with other tactics, particularly other tactics under strategy 2. More advanced externs or former externs will be involved in strategy 3 tactics.

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[45] See https://party.webmaker.org/.

[46] NetSquared, part of the tech non-profit TechSoup (http://www.techsoup.org/), is a global social network that is working "to make it easy, meaningful, and fun for people and organizations to get the information, visibility and support they need to maximize technology for social good" (http://www.netsquared.org/about#.U9uk1o1dV9c). For more about *Social Media Surgery*, see http://organizershandbook.wikispaces.com/Social+Media+Surgery.

Tactic 2.e: Establish a network of "maker spaces" oriented toward automation and other top-line applications of digital technologies

A *maker space* is a place with resources and tools to create things; "community centers with tools."[47] Typically, maker spaces are highly informal and focus on digital technologies for creating physical products—3D printing, for example. Maker spaces are not "schools" and don't certificates or degrees, but are more like clubs or workshops. Indeed, that's exactly how most are structured. Northwest Georgia already has at least one maker spaces: the 7Hills Makerspace in downtown Rome. 7Hills Makerspace exemplifies the "traditional" maker space.[48] But there are many variations. For example, the Makervillage is an adjacent cluster of commercial-residential spaces for creative entrepreneurs who have access to the 7Hills Makerspace. Here are three very different examples:

FirstBuild is an initiative of GE in conjunction with open source auto manufacturer Local Motors.[49] For GE, FirstBuild is a way to tap local talent in Louisville, KY, and "co-create" appliance innovations outside its corporate setting. FirstBuild is also a way for individuals to develop new capabilities and explore new occupations. Work done at FirstBuild gives individuals credibility. At the core of FirstBuild are challenges for which individuals develop solutions. Members of the FirstBuild community vote on the solutions. The top picks get built and the developers get recognized—and possibly paid—for their ideas. FirstBuild allows GE, a huge multinational corporation, to act like a startup. It taps open innovation and moonshine shop practices that have been hugely successful for companies like Boeing, General Mills, and Phillips, and takes those practices to the next level.

HackerLab is a co-work space and business incubator as much as a maker space in Sacramento, CA. HackerLab has a strong ideology: "We believe that technology can change the world and the starting point is education. Hacker Lab aims to educate folks and seed startups with community driven resources. Collectively we can build a brighter future using lean methods in both education and business."[50] It hosts a wide variety of classes and meetups. It is also has community mentors for startups, engineers, and designers, and maker space facilitators who help members with projects. The co-work work members have 24/7 access to coffee and tea and a wellness program as well as the HackerLab work space, high-speed internet access, and printers.

Two Bit Circus is more about entertainment and spectacle than corporate problem solving or small business development. Two Bit Circus wants to "reinvent the way people play" via interactive productions that engage and inspire people.[51] Their

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[47] "What's a Makerspace," http://makerspace.com/

[48] See 7Hill Makerspace website, http://7hillsmake.org/. Berry College also has a maker space, HackBerry Lab—"an interdisciplinary effort to constantly create and iterate innovative ideas" (from http://hackberrylab.com/)—for use of Berry's students and faculty.

[49] "GE's FirstBuild: Can a big company harness startup mojo on the backs of upstart entrepreneurs?" Lyndsey Gilpin, TechRepublic, April 17, 2014, http://www.techrepublic.com/article/ges-firstbuild-can-a-big-company-harness-startup-mojo-on-the-backs-of-upstart-entrepreneurs/; FirstBuild website, https://firstbuild.com/

[50] The HackerLab website, http://hackerlab.org/about/

[51] The Two Bit Circus website, http://twobitcircus.com/about/

clients are major consumer product, manufacturing, and technology companies that want to engage people with technology. So, Two Bit Circus isn't a maker space, per se, but they create spaces for people to experience and get excited about technology. The makers are employees who work to make technology fun and real for others.

The challenge of maker spaces is that they can be rather expensive and labor-intensive, and require on a dedicated group of enthusiasts to set up and operate them. The examples above reveal very different approaches to solving this problem: As a club, a corporate "open innovation" lab, or as event production company. It is possible that resources developed under strategy 1, particularly technology financing resources, could be used to fund maker spaces. There are also a number of planning tools and other informational resources available for maker spaces.[52] The challenge establishing and running the facilities remains. The process of implementing other tactics should be focus, in part, on developing a workable model for northwest Georgia.

The opportunity for Digital Region 1 is to leverage Federal funding from the Investing in Manufacturing Communities Partnership (IMCP) initiative to provide seed money or technology assets for maker spaces. Under this approach it would be up to enthusiasts, including technology leaders from industry, to develop a plan for the maker space. Resources would be awarded based on fit with DR1, fit with IMCP, and with the maker space's overall viability.

1. Investigate the practicality of providing resources to proposed maker spaces under the IMCP initiative
2. Solicit interest in establishing, operating, and sponsoring a maker space
3. Conduct events (see tactics 2.b and 2.c) to generate interest and support
4. Study a variety of maker spaces to define the focus and scope of services for the maker space
5. Develop a business model and criteria for maker spaces to receive resources
6. Establish processes for disbursing resources, tracking use, and auditing maker space programs as appropriate

Strategy 3: Targeted investments via public-private partnerships

Strategies 1 and 2 build capacity for deploying and using digital technology. This strategy is for actually doing so. The challenge is that this strategy and its tactics can only work if there is co-investment by parties that are committed to achieving real results (as opposed to just getting some cool technology). Execution of tactics under strategies 1 and 2 should engage these parties and build the relationship necessary to execute these tactics. Most of these tactics deserve full-blown strategic plans of their own, so these are necessarily abbreviated and highly simplified descriptions.

Tactic 3.a: Jointly procure technology, particularly software and training for local government and non-profit agencies

By purchasing technology together organizations can get better prices and performance. The process of identifying shared needs, finding and evaluating

[52] The "Makerspace Playbook," for example, available for free from http://makerspace.com/

providers, and managing delivery builds expertise and relationships. The following tactics are specific opportunities for this tactic.

1. Convene sector decision-makers to review technology strategies (developed via tactic 1.c), and identify key opportunities for joint procurement
2. Establish a framework for joint procurement (how costs, responsibilities, etc., will be shared)
3. Develop requests for proposals (RFP) and evaluation criteria
4. Distribute RFP, collect and evaluate responses, award contracts
5. Oversee delivery/implementation

Tactic 3.b: Create Wi-Fi clouds and "walled garden" websites for central business districts, cultural and recreation assets, public facilities, and other destinations

Wi-Fi is wireless computer network technology that is commonly used to provide internet access at various facilities, such as hotels, restaurants, schools, etc. Wi-Fi internet is often provided as an amenity for visitors. While this is great for visitors, the challenge is how to justify and manage the amenity. A "walled garden" is a limited set of websites that can access via a network. The walled garden could include advertisements, coupons, etc., for local attractions or businesses.

The opportunity is to use Wi-Fi to inform visitors about local businesses, public services, etc., within the walled garden. In order to go beyond the walled garden the visitor simply provides basic contact information, along with some additional information such as interests and preferences. This allows the Wi-Fi provider to better manage the service, generate value for sponsors, and market to visitors. The Wi-Fi/walled garden combination could be set up by a local government, a non-profit such as a downtown development authority, or by a for-profit company such as a network services provider or newspaper.

1. Identify locations for Wi-Fi systems, based on stakeholders' willingness to invest, and define the objectives
2. Develop a business/operating model for the Wi-Fi system, including size of the system and fees
3. Develop a technical model for deploying and maintaining the system, including the physical Wi-Fi network and the virtual walled garden
4. Engage vendors and/or develop an RFP and contracting process
5. Deploy the Wi-Fi and walled garden
6. Assess utilization and evaluate impacts

Tactic 3.c: Build "plug & play" high-performance network access into industrial and major commercial/office sites

Northwest Georgia has numerous middle mile networks. High-bandwidth telecommunications services are increasingly a critical asset for commercial and industrial sites. The challenge is to bring the two together. This tactic is essentially to build "last mile" connections from one or more middle mile networks into industrial sites and major commercial/office sites. The connections would include access points or points of presence. A company locating in a connected industrial

site can quickly establish service with little or no up-front costs. Manufacturers indicated that they face difficulties getting high-performance network access because industrial sites are often in locations that are not economical for broadband providers to serve. So, this tactic fits well with IMCP.

There are significant expenses involved, purchasing and installing cable and equipment. Actually engaging providers and getting them to provide services via these connections might be difficult unless there is a customer ready to purchase services. The biggest challenge, though, will be arranging for right-of-way access and/or pole attachments to build the connections. A major issue is who will pay the costs and do the work. Network service providers will want to directly recover any costs of building last mile network. In the end this would almost have to fall on the owner of the site, but their purview generally ends at the site's boundary. It may be necessary to establish an authority or similar entity to build and possibly own the last mile connections.

1. Explore organizational options to build, own, and run the network
2. Identify industrial sites and other business/commercial locations that would benefit from high-bandwidth connections, determine what services are readily available
3. Engage middle mile network owners and determine their criteria and willingness for providing service
4. Specify equipment and facilities that will be required to provide plug-and-play services to sites
5. Work with site owners to plan construction within the site
6. Identify possible routes for last mile connections, and estimate construction costs
7. Prioritize sites based on owners' ability and willingness to invest, cost to deploy, existing demand, and projected return on investment
8. Allocate funds or acquire financing
9. Conduct RFP process, as appropriate
10. Oversee and review project, as appropriate

Tactic 3.d: Conduct "open source" demonstration projects, particularly with local governments, non-profit agencies, and small businesses

One way to make leaders comfortable with technology is for them to see others putting it to use. This tactic could involve use of open source software, but it primarily means openly sharing the process and results. It involves using open source software to solve a particular business problem, and to do this in a public manner. The organization could be a private business, but a non-profit or government agency is a more likely participant. The primary purpose is to improve the organization's performance via digital technology, of course. The secondary purpose is to demonstrate how open source software can be a cost-effective solution.

This tactic would capitalize on the outputs of many of the prior tactics, particular technology financing, technology strategy (it would essentially be a case study in best practices and standards), and technology externs.

1. Engage technology companies to identify those with strong open source product sets and those willing to work in the open
2. Seek organizations willing to do an open project, ideally organizations that were already intending to implement an application or launch a website
3. Capitalize on resources from other tactics and negotiate with tech companies for discounts in return for marketing exposure
4. Engage media and use social media to document the projects
5. Incorporate the projects into conferences, workshops, and regional marketing

Tactic 3.e: Develop remote/rural broadband services

While it seems several remote or rural areas in northwest Georgia lack adequate broadband, it remains unclear exactly where or whether it makes socioeconomic sense to provide broadband in these areas. For example, the Pocket area in the heart of Chattahoochee National Forest does not have broadband. But there is no case for building infrastructure there, in fact quite the opposite: It may be desirable to leave places without internet.

Another issue that must be addressed is "what is adequate?" All of northwest Georgia is served by satellite broadband. Most of it is served by cellular broadband. These services are arguably not fast or robust enough for business or even most residential purposes. Even in rural areas, high-bandwidth services might be necessary for sustainable economic development. This issue might be best resolved via "open source" demonstration projects to deploy high-bandwidth services in rural and/or under-served urban areas in conjunction with tactic 3.d. Areas seem to lack adequate broadband include:

- Areas within the cities of Aragon, Braswell, Cartersville, Cave Spring, Cedartown, Emerson, Fort Oglethorpe, Lafayette, Resaca, Rockmart, Rome, Tallapoosa, Trion, Waco, and White
- Northeastern Bartow County and southeastern Gordon County, between Georgia highways 53 and 140
- Western Bartow County, west of Kingston
- Western Floyd County, north of Cave Springs
- Northern Haralson and southern Polk counties
- Southern Haralson County, south of Tallapoosa and between Tallapoosa and Buchanan
- Eastern Polk County, near Aragon and Braswell
- Western Polk County, between Georgia highway 100 and Alabama

A public authority, such might be needed to provide high-bandwidth plug-and-play networks to industrial sites, could lead broadband development in these areas. It would not make economic sense to use public funds to overbuild private infrastructure. A more economical and practical approach might involve the public

sector only gathering data and raising the issue. A grassroots approach, using models such as those developed by the New America Foundation's Open Technology Institute[53] or England's Broadband for the Rural North[54] (B4RN), might be even more economical. Grassroots approaches could be very effect for collaborative exploration and learning about digital technology.

1. Develop a simple survey: "If you can't get high-speed internet, please let us know your address."
2. Engage local governments and media to publicize the survey
3. Explore grassroots approaches
4. Map the addresses to areas to identify broadband gaps
5. Publicize the maps and engage broadband providers to help address
6. Seek other private investment, particularly from entrepreneurs, and direct investment by consumers in grassroots approaches

[53] http://oti.newamerica.net/

[54] http://b4rn.org.uk/

Digital Region 1 (DR1) planning process

The first step in the Digital Economy Planning (DEP) process was to identify priorities for the plan, and how leaders think about the digital economy and digital technology. We gathered this information via a series of 15 individual and small group "executive listening sessions" around the region during the 4th quarter of 2013. These sessions included a wide range of local leaders who were not technologists. We used the results of these sessions to identify what leaders saw as strengths, weaknesses, opportunities, and threats (SWOT) and what the priorities for the plan should be. This was a *subjective* SWOT analysis because it was derived from regional leaders' views.

During the first quarter of 2014 we conducted a series of focus groups with technology leaders in key sectors for the region: education, healthcare, manufacturing, local government, small business, and tourism. The focus groups reviewed the SWOT analysis to identify significant differences between the regional leaders' perspective and focus group participants' perspectives as technology leaders from various sectors.

We also convened two discussions with technology companies, one in Atlanta and one in Rome. The purpose of these discussions was to discuss partnership opportunities. If we are to instigate increased technology investment, technology companies stand to benefit from that. And, technology companies can, conceptually, provide resources to support the effort. The tech partner discussions identified which sectors, technologies, and implementation tactics the technology companies were interested in.

In parallel with these qualitative data gathering efforts, we conducted a survey of organizational technology use. This survey gathers reasonably detailed information about the extent and level of technology use and impacts by organizations. Much of the survey focuses on how much organizations spend on digital technology. It also asks about barriers and critical issues impacting use of digital technology.

Executive Listening Sessions

Conclusions

The results on the Executive Listening Session show leaders' perceptions of the digital economy in northwest Georgia. Table 6 presents the high-level result of a subjective SWOT analysis for technology resources in northwest Georgia based on inputs from participants in the executive sessions. Note how these issues compare and contrast with the digital readiness SWOT in the executive summary (table 1, on page 4). While the region is well positioned for the digital economy, there is no clear leadership vision and effort toward digital development. Northwest Georgia needs digital leadership to realize the region's potential.

Table 6. Subjective digital technology SWOT analysis for northwest Georgia

	S	W	O	T
Acquiring Digital Technology				
Funding	☐	◘	☐	☐
Know-how	☐	■	◘	☐
Strategy	☐	☐	◘	☐
Using Digital Technology				
Access/Infrastructure	☐	◘	◘	☐
Attraction/recruiting	☐	☐	☐	☐
Socioeconomic issues	☐	◘	☐	☐
Use and impacts	◘	◘	■	☐
Workforce	☐	◘	☐	☐

☐ Non-issue ◘ Minor issue ◘ Major issue ■ Critical issue

In general, know-how of key decision-makers was seen as a critical weakness for acquiring digital technology, and lack of funding was a major weakness. Uses for and impacts of digital technology were identified as a critical opportunity and as a major strength, but also a minor weakness. Know-how and strategy were discussed as minor opportunities and weaknesses for acquiring technology. Broadband access/infrastructure, socioeconomic issues, uses and impacts, and workforce were characterized as minor weaknesses for using technology, and access/infrastructure was also considered to be a minor opportunity. Attraction/recruiting was discussed repeatedly but largely in neutral terms. Interestingly, participants did not clearly identify any threats.

Decision-makers generally understand the "bottom line" benefits, and have focused on how digital technologies can reduce costs, particularly labor costs. The technology is a "necessary evil" for achieving business goals cost-effectively. There is a general awareness that digital technology could do more, but not real knowledge about how to tap that potential. While the digital economy means less reliance on traditional "real" assets, business practices—particularly financing—

have not yet adapted. Consequently, it can be difficult to assign a value to and finance digital technology.

Digital technology has been extensively adopted throughout the region with some impressive results. And, the region has a strong digital infrastructure base. But, it does not seem that these things are clear strengths, making the region more attractive and productive. The challenge is to build on current technology for greater economic growth. It is unclear to many regional leaders how to do this. Businesses are not going to magically grow or relocate in northwest Georgia just because there's some good technology. We have to use it better and more.

General socioeconomic issues, particularly educational achievement, make this a big challenge. It is clearly important to increase young people's digital skills, but many adults may not appreciate the extent of the digital economy and how it is impacting the region. Consequently, working age adults may be earning less than possible because they aren't developing their own digital skills, and discouraging young people from becoming more digitally talented. Leaders do not seem to see lack of a digital workforce as a major—let alone critical—issue. This is not too surprising given the apparent focus on reducing costs. But the region's digital economy can't develop without abundant digital skills. It is important to start asking what skills we need to increase capital investment, competitiveness, and profitability.

Possibly the major conclusion from this portion of the planning process is that key decision-makers are not fully aware of digital economy threats. The obvious threat is that the technology itself will cause problems, either through technological failure or through malicious use. The media is rife with stories of computer hackers and viruses bringing commerce to a screeching halt. A less obvious but even greater threat is that competitors will use the technology to our disadvantage. There are many examples of companies and whole industries that were eliminated by new technology. Just consider what happened to book and music retailing. There are, of course, many "regular" threats in our world, from weather, disease, crime, etc., that might be reduced by digital technologies. All of these threats are reasons to have a digital economy strategy.

This conclusion points to a general opportunity: To learn. What kind of strategy is best for reducing these threats? There is no simple answer to this question. To answer it leaders have to learn more about technology and its implications. How might technology be used to provide a competitive advantage, to improve performance, to grow markets and increase revenue? Some answers to this question might come from within the region, but most will come from studying what has been done elsewhere, best practices and missteps. The digital economy plan should include both activities that are intended to increase knowledge generation in the region and efforts to bring in knowledge from outside the region.

Background

The Executive Listening Sessions were a series of individual and small group discussions conducted to identify critical concerns and priorities for the digital economy planning process. It was made clear to participants that *the overall purpose*

is to attract investment and industry, growing local businesses, and support key institutions, not just to get technology.

Participants for the executive sessions were recruited via chambers of commerce, development authorities, and local governments. Some non-responding entities were targeted for individual discussions to assure that there was not a bias toward technology (e.g., participation only by those who see technology as important). See appendix for a list of dates, locations, and participants.

We specifically asked for participation from top officials and not technologists based on the idea that digital technologies are means to ends. We wanted to know about those ends, about what is important or problematic, and about what organizations across the region are trying to accomplish with digital technologies. In each session, we asked about these topics:

- Overall goals or issues
- Meaning of the term "digital economy"
- Approach to the digital economy
- Barriers to using digital technology
- What could be done at the regional level to boost the use and value of digital technologies

Data was gathered from forms completed by participants during the discussion and from notes captured by the meeting facilitator. The data was analyzed to identify major themes, and comments from the input forms and discussion notes were categorized by theme. These themes were essentially the priorities for the digital economy plan. All comments touched on at least one of these themes; some comments fell into multiple categories. In alphabetical order, the themes were:

- Broadband, digital infrastructure & services, and related technologies
- Decision-makers' awareness & know-how about/for digital technologies
- General strategy, how to deploy resources
- Impacts and uses of digital technologies
- Options for financing investment in and purchases of digital technologies
- Recruiting business & industry, citizens, and tourists
- Resolving socioeconomic issues, particularly imbalanced tax bases
- Workforce skills, particularly for digital technologies

The comments were analyzed a second time to identify whether they addressed the theme as a strength, weakness, opportunity, or threat. Strengths and weaknesses both refer to some characteristic of a thing (northwest Georgia regional technology resources, in this case) that affects its chances of succeeding or achieving some purpose (growing the region's economy, in this case). Opportunities and threats are outside factors that might impact success. Strengths and opportunities are positive, to be capitalized on and developed, whereas weaknesses and threats are negative things to be avoided and eliminated. Figure 4 illustrates how the concepts fit together.

	Internal	*External*
Positive	Strength	Opportunity
Negative	Weakness	Threat

Figure 4. SWOT analysis framework

The executive sessions and the themes that emerged from them were not explicitly or intentionally focused on technology—quite the opposite because we wanted to know *how, where,* and *why* technology might help. Regardless, those themes fit easily into two general categories: *getting* digital technology, and *using* digital technology. Comments from the discussions were also easy to categorize in terms of strength, weakness, opportunity, and threat, or none of the above (neutral), and whether participants talked about each as a critical, major, minor, or non-issue.

- Critical: These issues must be addressed in order to achieve the purpose. A critical strength must be built upon, and critical weaknesses must be eliminated. Critical opportunities must be seized, and critical threats are to be avoided at all costs.
- Major: Major issues strongly influences chances for success. They don't have to be addressed in order to be successful, but success is unlikely and will be difficult without addressing these issues.
- Minor: Minor issues could help or could hurt success, but are not likely to be a deciding factor.
- Non-issue (neutral): While possibly important for other purposes, non-issues have no impact on the likelihood of success.

Results

Acquiring digital technology

The only clear critical weakness expressed by executive session participants was their own know-how. They openly admitted to not knowing what digital technologies are available, what the technologies can really do, or how to evaluate the potential and, ultimately, performance of digital technologies. This uncertainty means they simply don't invest in digital technology. These results suggest decision-makers tend to buy technology that is functionally necessary and clearly reduces costs (i.e., jobs). By the same token, they saw know-how as an opportunity. They want knowledge about what technology to invest in, and they know that knowledge of how to invest in digital technology exists somewhere. Participants did not know where to find unbiased expertise and how to bring in to the region.

Participants, particularly those in local government, non-profit agencies, and small businesses found it difficult to pay for technology. Lack of funding was a major weakness. Small businesses had a general sense of potential benefits, but did not seem to have the budget or saw the investment in technology as too risky. Local governments had similar challenges. Taxpayers are unwilling to fund investments to improve local government: Technology must reduce costs and increase efficiency. Local government officials felt as if they had done all they could to use technology to

cut costs. Non-profits seemed unaware of many of the potential benefits of digital technology, particularly "top-line" uses to increase revenue. This may be because their comments suggested they had no budget for technology, even as a means to reduce other costs (of course, many non-profits are so lean that there are really no costs to reduce).

It is notable that none of the issues that came up in these discussions were characterized as a threat. The participants did not identify external factors or forces that could negatively impact the region's economy. It is not that such threats do not exist; they do. Rather, it seems participants were unaware of or unwilling to discuss them. This result bolsters the need for greater know-how among decision makers and better strategies for investing in digital technologies.

Participants talked about technology strategy as an opportunity. They were very open to having a strategy, for the region as well as their own organizations. More generally, participants welcomed opportunities to learn about technology strategy, about how technology might help them, and they want to explore how they might collaborate across organization and sector boundaries. (Note that there is undoubtedly some "selection bias" at work here: Persons who participated in the executive session are likely more willing to collaborate and learn than those who did not participate).

Using digital technology

The most prominent issue as a strength, opportunity, weakness, or threat for using digital technology, was current uses and impacts. Participants could identify multiple current uses and positive impacts in their own organizations, and saw these as precedents for additional uses. But, they also realized that their organizations were not as strong with digital technologies as they needed to be in order to be fully successful. The one critical opportunity that emerged was to draw in expertise, to look globally at best practices for using digital technologies, and to replicate the expertise and practices in northwest Georgia.

Broadband access and infrastructure were characterized as both a minor weakness and a minor opportunity. They were aware of gaps in broadband but did not see it as a critical or even major barrier to regional economic development. That is not to say they don't want to close these gaps! Specifically, there was interest in ways to provide broadband to major industrial (fiber optics for speed and reliability) and commercial areas, such as downtowns (wi-fi clouds for flexibility). Participants also expressed concern about isolated residential areas, particularly for poor families whose children are at an educational disadvantage because they don't have broadband at home. Generally, they saw this as an opportunity for wireless (cellular, "4G") service. There were also concerns about public safety in areas without wireless access.

Socioeconomic issues and workforce were both expressed as minor issues in regards to regional technology. The socioeconomic issues primarily related to the structure of the economy: Less educated, lower income, and older citizens are less likely to use digital technologies. They are also less likely to support investments in

such technologies. In some areas there was also concern about imbalance tax base: residential properties generate lots of demand for public services, including education and public safety, but relatively low revenue. Business and industrial properties, in contrast, generate relatively higher revenue without as much direct impact on demand for services. This imbalance was an issue in and of itself because it limits technology use for economic growth. It was also an issue because most citizens do not understand the problem and are unwilling to support technology use to resolve it.

Workforce and attraction/recruiting were notable issues because they were discussed a lot, but generally these issues were "just there," and not characterized as strengths, weaknesses, opportunities, or threats. Workforce was overall the most critical issue that was raised in these discussions, *but not in terms of digital technology*. Yes, lack of technical skills was seen as a minor weakness, but it did not rise to the level of "we must do something about this." Indeed, while it was an issue most participants—with the clear exception of educational institutions—were not actually doing anything to address it.

Use of digital technology for attraction and recruiting was an even more paradoxical issue. Effectively all participants clearly and strongly wanted to attract and recruit someone: new customers, industry, residents, tourists, etc. They also had a general sense that the region has to *have* technology if they are to be successful with attraction and recruitment. But, there was very little discussion about how technology might be used to attract or recruit these parties. The small exceptions were tourism and member engagement. There were passing mentions of attracting tourists via digital technologies: how to get them to stop and spend money. Similar occurred for attracting and recruit customers (for businesses and non-profits) and industry (for economic development organizations, including Chambers of Commerce and local governments). These functions were mentioned but were not associated with terms that clearly showed participants thought of them as a strength, weakness, opportunity, or threat.

Technology Leader Focus Groups

Conclusions

Technology leaders clearly see threats—as well as opportunities—from technological change. On one level they faced the simple need to keep up with technological change. Generally, hardware is less expensive and more powerful, but this change also means more devices, used in more ways, in more parts of the organization. This creates functional challenges—keeping all of these diverse devices working consistently—but it also makes it more difficult to keep out malicious software and stop unauthorized use of technology.

Social forces, such as interpersonal communication via social media, drive some of the technological change. Most of the change is driven by competitive or regulatory imperative. Competitive imperatives are "healthy." So, for examples, technological innovations at Lake Point Sports and Shaw Industries allow these organizations to provide a better product and have stronger customer relationships than their competitors. Regulatory imperatives, in contrast, drive spending on technologies that don't really improve outcomes. For example educators have to pay for large scale standardized tests and healthcare institutions have to implement unproven health information exchange technologies.

Those industries that are pushing the envelope with technology—particularly healthcare and manufacturing—are impeded by lack of technological talent. They especially need persons with deep technical knowledge who also know their industries' operational environments. Sectors that do not have strong drivers for technology investment—local government and small business—need better information about how and why to invest in digital technology. Education and tourism lie somewhere between, and share a need for a strategy to deal with both technological change and change in their customers' habits and interests.

All face difficulties financing digital technology investment and in connecting their organizations internally and externally. These are not huge problems, and they vary a great deal between organizations and sectors, but they are big enough to impede digital development in northwest Georgia.

Background

The second phase of data gathering involved getting feedback on executives' perceptions from technology leaders in key sectors: education, healthcare, government, manufacturing, and tourism. We also conducted a focus group on digital technology in small business with Chamber of Commerce representatives. We asked each focus group how their experiences and perceptions jibed with the executives' perceptions. The inputs came from a range of leaders who were not from a particular sector and were not technologists. So we also asked about how the results were different from or similar to their sector. Finally, we asked what they as technology leaders felt could be done at a regional level to improve the digital economy.

Results

The following are summaries of the focus group participants' response to the regional technology SWOT analysis: Where they saw the issues differently, more detail on the issues, and regional strategy from technologists' perspectives. See appendix 2 for full write-ups of focus group results. Note that small business and tourism were a bit different because the participants were generally not technologists, per se, but persons with insights into how technology was being used and the barriers and potential benefits of digital technology.

Education

Educational technologists saw the issue of know-how in terms of technology planning that was essentially "hurry to catch up with yesterday." This results in investments that won't accommodate emerging trends, such as "bring your own device" (BYOD), and doesn't make short-term investments critical to long-term outcomes. The level of funding is a challenge but also how the funds are allocated: Schools need to focus less on front-end devices and more on back-end systems to provide consistent and secure functionality across diverse devices. Such a change in focus would allow schools to be more efficient and responsive in order to provide better learning experiences and better educational outcomes.

More attention needs to be paid to making personal devices and broadband services available to disadvantaged students for use outside school hours. It is also necessary for educational institutions to foster digital skills beyond the traditional student bases. The parents and grandparents of K-12 students need these skills to effectively support their children's education. And, they need these skills as a foundation for their own personal and professional development. Broad-based skill development and for persons who are not actual students falls outside the bailiwick of educational institutions. So does broadband access for students outside of school. But both are important to the success of students and to the outcomes of the regional digital economy plan.

Government

Funding, know-how, and strategy are definitely major issues for local government technologists. Generally, effective use is difficult because of these issues. The focus is totally on cost cutting. Officials are reluctant to spend money on technology and have a preference for inexpensive technology, which can result in large costs in the long-term. For example, inexpensive remote access solutions put critical data at risk. Another example is lack of integration between emergency services, public safety, and courts, which results in inefficiencies, and could lead to much worse. Limited digital skills among local government personnel also drive up technology costs.

Infrastructure is reasonably good except in areas that are good rich markets for telecom companies. Some of these areas are remote, but others are in town. Local governments don't have much budget for personnel, so they have a very high ratio of users to support personnel. Lack of personnel also makes it difficult to implement technologies that need a great deal of customization, even if though these "open source" technologies tend to be much less expensive. The biggest issue is lack of

education for decision-makers and users about how to get the right technology and how to use it effectively.

Healthcare

The technological SWOTs for healthcare are rather different from other sectors and from the northwest Georgia overall. First of all, healthcare organizations tend to have abundant know-how among decision-makers, and the technology leaders are actively involved in strategic decision-making.

But, healthcare providers face threats from regulations, payers, and government agencies that mandate providers use certain technologies. Many of these technologies are very new and unproven, and the mandates also require onerous reporting. The mandates often have conflicting goals, such as making information freely available and keeping it secure. These factors drive up costs. There is funding available to pay for the mandated technologies, but it falls far short of the costs. And, the mandates leave few resources to implement more proven technologies that have clear business value.

Healthcare providers need multiple levels of expertise, largely due to the mandated technologies. They need consultants with deep expertise to implement particular technologies. Internal technology personnel need to have reasonably deep expertise, but also need to understand the clinical environment. Such technology professionals can be difficult to find and bring to the region. All personnel, including doctors and nurses, need basic technical skills, and these skills need to be constantly updated because of changing technology. General personnel could do a lot more with the technology with additional skills. Lastly, healthcare providers have to worry about patients' capabilities, because they are mandated to have patients using online health portals.

Technological assets in the region, particularly broadband services, are on par with comparable places, although healthcare technologists would like to see ubiquitous cellular phone data services to support mobile applications. The region's healthcare assets, though, are exceptional and could be leveraged to attract business capital investment and professionals to the region. Healthcare technologists are involved in professional organizations and in some cross-sector groups in the region, but they feel it would be good to have more access to others with technical knowledge in the region.

Manufacturing

Digital technology is generally seen as a means for cost reduction, if not a cost. For the region, it could be a differentiator because northwest Georgia is home to some of the highest tech manufacturing facilities in the southeast. The manufacturers are investing in new technologies and expanding their information technology groups. They are concerned that their demand for technologists will far outstrip supply. Generally, they don't have concerns about broadband availability, although several members of the focus group noted difficulties deploying networks.

Manufacturers have both business systems and automated production systems. They need individuals who can work on both types of systems. Like healthcare, manufacturers value hybrid employees who can work on both the shop floor and in the office setting. The manufacturers have a hard time drawing and retaining employees from outside the region. They prefer to hire folks who have roots in the area. But, they also find that employees who were educated in the region do not have the skills they need. That said, many applicants from outside the region don't have the required skills, either. This situation is compounded by local young people's lack of awareness of technology opportunities in manufacturing in the region. Too many of them leave in search of technology jobs that exist close to home. The region should do more to attract and retain talent, particularly in competition with the Atlanta region.

The manufacturing technology leaders saw the need for more strategic approach to digital technology. They provided several general suggestions for doing this, and they expressed willingness to help other sectors, particularly local governments and non-profits, to implement these suggestions. (See the appendix for more information on these suggestions.)

Small business

Small business owners are generally unwilling to invest in digital technology because they don't understand it or what it could mean for their businesses. They generally don't want to put their own time into learning about the technology, and won't pay for their employees to learn about it either. They hear about the importance of technology, but don't seem to internalize how and why it's important.

Small business specialists, in contrast, see many needs and opportunities for technology in small businesses. But, they are challenged to communicate this to their clients. There appear to be several parts of this challenge. First, small businesses have limited funds and see technology as an expense with limited and uncertain benefits. Second, small businesses and small business people are very diverse. Third, small business people often lack basic technology skills and do not understand concepts and terms related to the digital economy. But this issue has to be addressed in conjunction with the prior issue: While some small businesses are "digitally illiterate," others are very digitally literate and even use digital technology as the basis for their business.

To address this challenge northwest Georgia should, first, provide education and information for small business specialist so they can be "tech translators" for their clients. Involve technology leaders and technology educators as technology ambassadors. The content should be very practical: "Here's how to use this particular technology," and "This is what your competitors, customers, and partners do with technology."

The region also needs "technology facilitators," who can provide "hand-holding" for small businesses. These facilitators will almost have to be young people, college and high school students, who will need significant coaching and support in this role. So, technology facilitators should be learning practical knowledge about business and

reasons to stay in the region. The technology ambassadors and translators should be actively engaged with the facilitators. A key role for all of these team members is to produce bite-sized content for small businesses that focuses on the benefits of digital technology, particularly how it can be used to generate more revenue and profits, and make life easier for small businesses.

Tourism

Funding and know-how for digital technologies are critical issues in tourism. Tourism professionals need to understand the full benefits of digital technology, how to incorporate them into strategy, and how to measure the impacts. Each type of tourism stakeholder has a different implication for benefits, funding, metrics, and strategy.

Broadband infrastructure and network access is important for business travel, conventions, and meetings. Apps, online information, and social media are more important for leisure travel, especially for reaching younger travelers. The technology can make visitors' experiences more fun and rewarding. It can also give technology professionals insights into what visitors want and how to get them to come back and bring their friends.

Tourism professionals across the region need education and information about digital technologies. They need to know what is available, what's coming, and how to fully use it. They need to engage vendors in ways that increase the benefits and reduce the costs from digital technology. Tourism needs a digitally skilled workforce, and can provide real-world learning opportunities in partnership with education and industry. Generally, tourism needs partnerships to share best practices and help each other, from the grassroots up, particularly to get and use digital technology.

Organizational technology survey

Conclusions

Northwest Georgia's small to medium organizations, particularly those in manufacturing and skilled services, are flourishing with technology. These organizations, while not technically "large," dominate their sectors in the region. In other words, the following conclusions apply to leading organizations. The conclusions also suggest how and where other organizations can capitalize on digital technology.

Generally, digital technology creates the greatest value by boosting productivity. The technology is also important for reducing costs. But, many organizational functions, even among high-performing, technologically sophisticated organizations, make no use of digital technology. And, there has been relatively low use to generate new sources of income. Some gains might be seen from simply using data more to inform decisions, but the biggest opportunities seem to be using digital technologies as a way to deliver enhanced or totally new products and services.

Respondents' organizations have spent a lot on computer hardware and are focusing on software for tracking organizational performance and connecting with customers (e.g., websites). Use of the web as anything more than online brochures is limited. Cloud computing looms large in organizations' planning and consideration for future projects. Given these results, we can expect for websites to become more integrated into business functions (or vice-versa) and for those sites to be hosted in the cloud rather than on traditional web servers.

The biggest barriers to achieving greater outcomes are the costs and difficulty of financing digital technology and the need for more expertise among technology staff. These barriers seem to be exacerbated by the difficulty of replacing current technologies and need to continually update new technologies. Leaders of these organizations are committed to technology, understand its value, and are not concerned about negative impacts.

Broadband and workforce are not huge issues currently for these organizations. But it is reasonable to conclude that these would be much larger issues if there were greater adoption and use of digital technologies. If the other barriers were reduced, the market/technology leaders would need more connectivity and workforce. Particularly as business functions move onto the cloud and the web. Notably, manufacturing—which has been the most aggressively investing technology for business reasons (as opposed to institutional or regulatory)—was the one sector that noted a need for connectivity and tech-savvy workers. This need will be multiplied by more extensive adoption and use by other organizations and sectors.

There is a significant market for digital technology among organizations in northwest Georgia. And, this market is growing. The demand is likely to shift from hardware to network applications and services. It seems reasonable to expect that spending will also shift somewhat toward support and training. This spending will

ripple through the region quite directly because most of these organizations are headquartered in the region and primarily serve the region. How much of the spending will go to "imports" versus to growing locally based technology companies remains to be seen. Northwest Georgia is reasonably easy for tech companies in Atlanta, Birmingham, and Chattanooga to access. On the other hand, regional technology companies that grow on regional demand could also tap demand in these nearby metros. So, increasing spending on digital technologies could fuel (or bypass) growth of regional technology companies if those companies can provide expertise for shifting enterprise applications to cloud- and web-based applications.

There are big holes in our data and therefore our conclusions: Several counties and sectors basically did not provide any data. It would be simple to conclude that those areas simply are not concerned about the digital economy. A more reasonable conclusion might be that they simply had other priorities and were not aware of the need and opportunity for their input. Regardless, we can conclude that the data from the organizational technology survey, in conjunction with other parts of the planning process, points to clear opportunities to grow northwest Georgia's digital economy.

Background

The purpose of the organizational technology survey was to understand how organizations in northwest Georgia are currently using digital technology, and their goals for and barriers to improved use. The survey data allow deeper understanding of findings from other parts of the planning process, and validate tactics for the plan. The survey was one of the first elements of the planning process, launched in October 2013, and was one of the last, closed in early May 2014. It was conducted online, was designed to be answerable for any type of organization, and had a total of 35 questions. The questions were about basic information about the organization, about levels of spending on information technology, and about impacts of and plans for technology.

We received a total of 282 responses. Several of those were not true responses, but were individuals who were obviously just perusing the survey. There were several duplicate responses, either individuals responding multiple times, or multiple responses from different individuals in an organization. After we eliminated duplicate and incomplete responses, we were left with a total of 132 responses. The following section discusses the results of the survey.

It should be noted that, because of the nature of the survey—that is was about technology, and that it was conducted online—we can presume that respondents are relatively more tech-savvy that non-respondents. We also promoted the survey via the Regional Commission, which is comprised of local governments, and via Chambers of Commerce, some of which were highly engaged in the planning process but some were almost totally unengaged. So, local governments and organizations in counties with engaged chambers were much more likely to be aware of the survey. Generally, we got a much higher proportion of local governments to respond than

retailers. Specifically, although there are 2,564 retailers in northwest Georgia, only three of the responses came from retailers.

This is called *non-response bias*. It can be a real problem because the results cannot be generalized. For example, we cannot say that the response of a particular retailer tells us anything about retailers in general. We can address this issue somewhat by weighting responses: We can give responses by retailers a heavier weight than responses by local governments. But this doesn't address the issue that the retailers who did respond are likely to be much more tech-savvy than those who did not respond. It also doesn't help us with categories that did not respond at all. For example, there are 565 transportation and warehousing establishments in northwest Georgia, none of whom responded to this survey.

On the other hand, non-response patterns tell us important things. The results of the executive sessions and focus groups pointed to a lack of awareness of digital technologies and the opportunities and threats of the digital economy. The implication is that the plan should be to greatly increase awareness. The survey response patterns tell us about whom we're reaching and who we're not. And, the responses themselves tell us where those organizations that we are reaching are with digital technology investment and use. This is great information for making a plan, and a great starting point for implementing that plan.

Overview of survey respondents

Table 7 shows how many survey responses we received from each industry sector, at the top level (2-digit NAICS code). It also show the percentage of total responses that came from that sector and the rate of response for that sector based on the number of establishments in that sector in northwest Georgia. The data are sorted by response rate.

The highest relative response rates were among utilities, local government, arts, and education sectors. Technology-related organizations—information, technical service, and other service—also responded at high rates. While the response rates for finance and manufacturing sectors were not especially high, a solid portion of the responses came from these sectors. Four of the six focus areas for the SWOT analysis were among the high-responding sectors. Healthcare was not, but the responses we received were from some of the largest and most progressive organizations in this sector. As discussed below, the majority of responses came from organizations with 50 or fewer employees.

We had no responses from administrative support, management, mining, and transportation sectors, and only one from hospitality sector. Administrative support, hospitality, and transportation sectors all have a significant presence in the region. Together these sectors include nearly 2,500 establishments, or about 17% of all establishments in the region.

Table 7. Survey responses by sector

	Sector	*Resp's*	*Percent*	*Estab's*	*Rate*
High-responding (>=1%)	Utilities	4	3.0%	30	13.3%
	Public Administration	26	19.7%	329	7.9%
	Arts, Entertainment, and Recreation	7	5.3%	149	4.7%
	Educational Services	17	12.9%	433	3.9%
	Information	5	3.8%	185	2.7%
	Finance and Insurance	13	9.8%	748	1.7%
	Professional, Scientific, and Technical Services	16	12.1%	1,215	1.3%
	Manufacturing	11	8.3%	1,148	1.0%
	Real Estate and Rental and Leasing	5	3.8%	525	1.0%
Low-responding (<1%)	Other Services (except Public Administration)	9	6.8%	1,055	0.9%
	Agriculture, Forestry, Fishing and Hunting	1	0.8%	118	0.8%
	Construction	6	4.5%	1,537	0.4%
	Health Care and Social Assistance	5	3.8%	1,292	0.4%
	Wholesale Trade	3	2.3%	983	0.3%
	Retail Trade	3	2.3%	2,564	0.1%
	Accommodation and Food Services	1	0.8%	1,176	0.1%
Non-responding	Administrative, Support, Waste Mgmt, and Remediation Services	0	0.0%	740	0.0%
	Transportation and Warehousing	0	0.0%	565	0.0%
	Management of Companies and Enterprises	0	0.0%	58	0.0%
	Mining, Quarrying, and Oil and Gas Extraction	0	0.0%	24	0.0%

Response by employment

Respondents' organizations employ a total of just over 170,000 people, with just shy of 40,000 or 23% of those employed in northwest Georgia. The average of respondents' total employees was just over 1,500 with just of 300 on average in the region. In contrast the median total number of employees was 25 and the median number of employees in the region was 20. Table 8 shows that over half (52.5%) of respondents were with organizations that employ between two and 50 persons in northwest Georgia. Well over 10% of the respondents' organizations have over 1,000 employees.

Table 8. Responses by number of employees

	Responses			
Number of employees	*In region*	*Percent*	*Total*	*Percent*
1 employee	12	10.2%	9	8.2%
Between 2 and 10 employees	37	31.4%	36	32.7%
Between 11 and 20 employees	5	4.2%	4	3.6%
Between 21 and 50 employees	20	16.9%	15	13.6%
Between 51 and 100 employees	6	5.1%	6	5.5%
Between 101 and 200 employees	5	4.2%	4	3.6%
Between 201 and 500 employees	11	9.3%	10	9.1%
Between 501 and 1,000 employees	9	7.6%	7	6.4%
Between 1,001 and 5,000 employees	6	5.1%	10	9.1%
Between 5,001 and 10,000 employees	0	0.0%	2	1.8%
Between 10,001 and 50,000 employees	1	0.8%	2	1.8%
Between 50,001 and 100,000 employees	0	0.0%	1	0.9%

Let's consider the size of sectors represented by respondents. If we take 1% response rate as a break point[55], our highest rates of response were from sectors that employ 120,973 persons or about 50% of the regions' employees. Non-responding sectors, including hospitality, have less than 18% of the region's employees. Low-responding sectors included healthcare, which was one of our focus areas. These sectors include 31% of the region's employees. That said, organizations in low-responding sectors average less than 10 employees per establishment, so these are the "small businesses." High-responding responding sectors average over 26 employees per establishment, and non-responding sectors average fewer than 18 employees per establishment.

Looking at just the respondents, we see that those in the high-responding sectors employ a total of 36,761 persons, or 15% of the regions employees. The respondents were relatively large organizations, averaging over 250 employees each. Many of the respondents were among the largest organizations in their sector. For examples, responding manufacturers were over 40 times larger than the region's average manufacturer, responding healthcare providers were 28 times larger than the average, and educational institutions that responded were nearly 13 times larger than the average educational institution in the region. In contrast, our respondents from retail, agriculture, information, arts, and real estate sectors were significantly smaller than average for those sectors.

[55] Including manufacturing, which had 0.958% response rate. The rationale for this is that the responding organizations are relatively large manufacturers and employ over a quarter of the persons working in that sector.

Table 9. Respondent size in revenue

Revenue Range	*Count*	*Percent*
Under $500K	51	38.6%
Over $500K up to $1M	6	4.5%
Over $1M up to $2M	4	3.0%
Over $2M up to $10M	16	12.1%
Over $10M up to $50M	19	14.4%
Over $50M up to $100M	5	3.8%
Over $100M up to $200M	3	2.3%
Over $200M up to $500M	2	1.5%
Over $500M	9	6.8%

Response by revenue

The survey also asked about the fiscal size of organizations. Recognizing that respondents might be unwilling to specify their organizations' revenue, they were asked to select a range. Table 9 shows that while the majority of respondents (73%) have annual revenue under $50,000,000. Nearly 40% have revenue under $500,000. On the other hand, nearly 7% have over $500,000,000 in revenue, so these are some important players in the regional economy. The responding organizations represent significant purchasing power. If we just take the midpoint for each revenue range, the estimate total revenue of respondents is almost $700,000,000.

To summarize, the largest organizations in our targeted sectors, except tourism, responded to the survey. All of our targeted sectors responded to the survey. Healthcare was the only sector in the low-response group, but those organizations that did respond employ almost one-third of the persons in that sector. While the non-responding sectors are important, the planning process did not target them. One implication is that the results of the survey should be considered reliable and valid for the targeted sectors, at least the larger organizations. Another implication is that the plan itself should include outreach to smaller organizations and organizations in the low-responding and non-responding sectors. The respondents run the gamut in terms of employment and revenue. The respondents in our targeted sectors tend to be large, but many of the respondents are small organizations.

Respondents' growth projections

On average respondents expect their organizations to grow at 8%. As table 10 shows, the most rapid growth is expected to be among sectors that have led or are instrumental in the deployment of digital technology. An unexpected growth area for the region may be retail. The three respondents in this industry expect to grow by 10.5%, which is far more than the 4.1% growth projected by the National Retail

Federation.[56] Overall, the U.S. economy is projected to grow 2.4% in 2014.[57] So, on average, respondents in all of our targeted sectors, other than education and public administration—expect their organizations to grow faster (over twice as fast) than the economy as a whole.

Even respondents in targeted sectors that are on the lower end of the growth projections seem to have a more optimistic view than their peers across the nation. For example, the Manufacturers Alliance for Productivity and Innovation says[58] the sector will grow at 3.2% in 2014. In contrast, the eleven respondents to our survey in manufacturing expect their companies to grow over 5% on average.

Recall the caveat above: because of the way the survey was distributed and promoted respondents are likely more tech-savvy their others in their sectors. Is the difference in projected growth due to technology investment? That would stand to reason, but it is difficult to say based on just the survey data. There are many other factors that may be at play: the respondents' sub-sectors, size, regional characteristics, management, economic factors, etc. But, considered in conjunction with the focus group results discussed above, it is reasonable to say that northwest Georgia's most tech-savvy organizations are also the fastest growing.

A more general implication is that respondents are likely among the fastest growing organizations in the region.

Table 10. Projected growth by sector

Sector	*Growth*
Overall	**8%**
Professional, Scientific, and Technical Services	19.9%
Finance and Insurance	17.8%
Information	16.8%
Health Care and Social Assistance	14.3%
Retail Trade	10.5%
Arts, Entertainment, and Recreation	8.7%
Real Estate and Rental and Leasing	8.3%
Other Services (except Public Administration)	6.8%
Construction	6.0%
Manufacturing	5.1%
Utilities	2.8%
Educational Services	2.3%
Wholesale Trade	1.7%
Public Administration	1.3%

[56] http://www.nrf.com/modules.php?name=News&op=viewlive&sp_id=1766

[57] According to the Conference Board, http://www.conference-board.org/data/usforecast.cfm

[58] http://www.industryweek.com/global-economy/manufacturing-production-grow-through-2015-mapi-forecasts

Response by location and geographic scope

The survey asked in what northwest Georgia county the responding organization had its primary (or only) location. And, we asked about the organizations' geographic scope—whether their headquarters and customers are located in the region or elsewhere.

Table 11 shows the number of responses and the percentage of all response from each county. It also provides a response index that measures the strength of response. This index was created by dividing the percentage of response from that county by the percentage of the region's business establishments in that county. An index of "1" means that the percentage of responses was equal to the share of business establishments in that county. The higher the index, the stronger the response rate from that county relative to the rest of the region.

It should be emphasized that the planning process involved multiple outreach attempts to Chambers of Commerce, development authorities, and local governments in all counties. The Regional Commission does not have the resources to do direct marketing to organizations, so we relied on the local leaders to help recruit respondents.

Table 11 has several implications for the digital economy plan. The first is that the survey results say the most about the counties with strong response rates. And, since the plan is informed by the survey responses, the plan may be oriented toward the needs, opportunities, and priorities of those counties' organizations. The second implication is that the index may be seen as an indicator of leaders' interest in the digital economy. Those counties that have an index of 1.0 or greater are likely to have a higher incidence of leaders who are aware of, concerned about, and planning for digital technologies. The last implication is strategic. The general strategy of building on strengths to overcome weaknesses could be interpreted to mean developing a deeper understanding of the attitudes and concerns of leaders in counties with low response indices while highlighting how organizations that responded to the survey have impacted their local economies via digital technology.

One often noted aspect of the digital economy is that it reduces the "friction" of distance. Consumers can find products all over the world, and vendors can tap into distant or distributed markets. Digital technology also allows businesses to put their production facilities and technical personnel closer to their customers. This is a boon for regional economies in two ways. First, it allows locally based companies to expand and grow by selling outside the region. Second, it allows companies headquartered elsewhere to invest in the region.

Table 11. Responses by county

	Responses		
County	*Number*	*Percent*	*Index*[59]
Bartow	7	5%	0.40
Catoosa	3	2%	0.36
Chattooga	0	0%	-
Dade	2	2%	0.98
Fannin	6	5%	1.16
Floyd	16	12%	0.87
Gilmer	2	2%	0.39
Gordon	4	3%	0.42
Haralson	24	18%	6.05
Murray	0	0%	-
Paulding	3	2%	0.20
Pickens	24	18%	3.91
Polk	1	1%	0.18
Walker	21	16%	3.15
Whitfield	5	4%	0.23

Table 12. Geographic scope of respondents

	Responses	
Geographic scope	*Number*	*Percent*
Local headquarters, local customers: education and government	38	31%
Local headquarters, local customers: other	24	20%
Local headquarters, regional customers	29	24%
Local headquarters, national & international customers	19	16%
Headquarters in southeast US, local & regional customers	4	3%
Headquarters in southeast US, national & international customers	2	2%
Headquartered outside southeast US	0	0%
Other or not sure	4	3%
Total	120	98%

[59] Based on the number of establishments as reported by the US Census Bureau 2011 County Business Patterns

Survey respondents were overwhelmingly headquartered in the region. Respondents in education and public administration sectors were pulled out because they are assumed to be locally headquartered and largely, if not exclusively, focused on local or regional markets.[60]

The primary implication is that respondents' decision-making is done here. The technology proposition for locally focused organizations is to make it easier for customers (citizens, constituents, parents, and students) to access them. Of course, this presumes the organizations *want* to be more accessible and responsive. For other organizations, the technology can help them expand their markets and reduce the costs of selling into and supporting distant markets. This is important not only because it means bringing capital into the region via exports but also because it means increasing demand for technological skills and occupations.

Results

Information technology spending[61]

Ninety-five of the survey respondents shared the size of their information technology (IT) budgets. The total for all respondents was $217,919,005.00, for an average of $2,293,884.26 and median of $15,000. The average IT spending per employee for the respondents was $4,062.79 and the median $1,000.00. The average expected growth in IT spending for respondents was 11% and the median expected IT growth is 2%. Overall, respondents expected IT spending to grow one-third faster than overall organizational growth.

On average, respondents spend about a third of their IT budgets on hardware, which represents nearly $68,000,000 is spending. Software is just over a quarter and technology-related services just under a quarter of IT budgets on average, which represent nearly $60,000,000 and $50,000,000 in spending, respectively. In contrast, 13% of IT budgets go to user support and training, which is less than the 17% budgeted for other IT. Regardless, nearly $30,000,000 is spent on support and training by respondents.

Table 13. IT budget breakdown

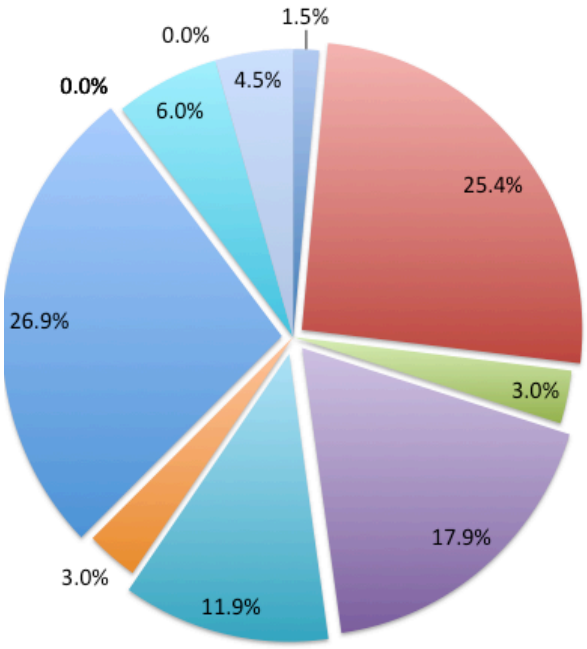
IT budget category	*Average*	*Total*
Computer and network hardware and peripherals	31%	$67,691,090.93
Computer software, including internet applications	27%	$57,848,728.97
Technology-related services including telecom	22%	$48,609,558.05
Technology user support and training	13%	$28,669,084.68
Other	17%	$37,150,001.80

[60] This assumption may not hold for some higher education institutions, but is reasonable for the sake of this analysis.

[61] The data are for all locations and many of the respondents have a large portion of their organizations outside the region. Based on survey responses we estimate totally annual spending on digital technology in northwest Georgia is $23,000,000.

Internet connections and websites

Sixty-seven respondents (just over half on the usable responses) told us what type of broadband their organizations have. Of those, only one said their organization has no high-speed, always-on internet connection. As figure 5 shows, fiber optics and telephone company DSL were the most common types of broadband for respondents, followed by "traditional" telephone company digital carriers (i.e., "T-1"). About 12% of respondents have broadband connections from cable companies.



None	1	1.5%
Telco Asymmetric xDSL	17	25.4%
Telco Symmetric xDSL	2	3.0%
Other Copper Wireline ("T-1")	12	17.9%
Cable Modem - DOCSIS 3.0	8	11.9%
Cable Modem - Other	2	3.0%
Optical Carrier/Fiber optics	18	26.9%
Satellite	0	0.0%
Unlicensed Fixed Wireless	0	0.0%
Licensed Fixed Wireless	0	0.0%
Cellular/Mobile Wireless	4	6.0%
Electric Power Line	0	0.0%
Other (municipal telecom)	3	4.5%

Figure 5. Type of Broadband Connection

Over 50% broadband speeds reported by respondents were between 3 and 10 megabits per second (mbps), as show in figure 6. A third were between 100 mbps and a gigabit per second. Not surprisingly, most of the respondents that reported this speed had fiber optic connections. One had a cable modem. And about an eighth of responses said their broadband ran less than 1.5 mbps. One of these respondents was on fiber (it is not clear whether this fiber connection was only partially used for internet access).

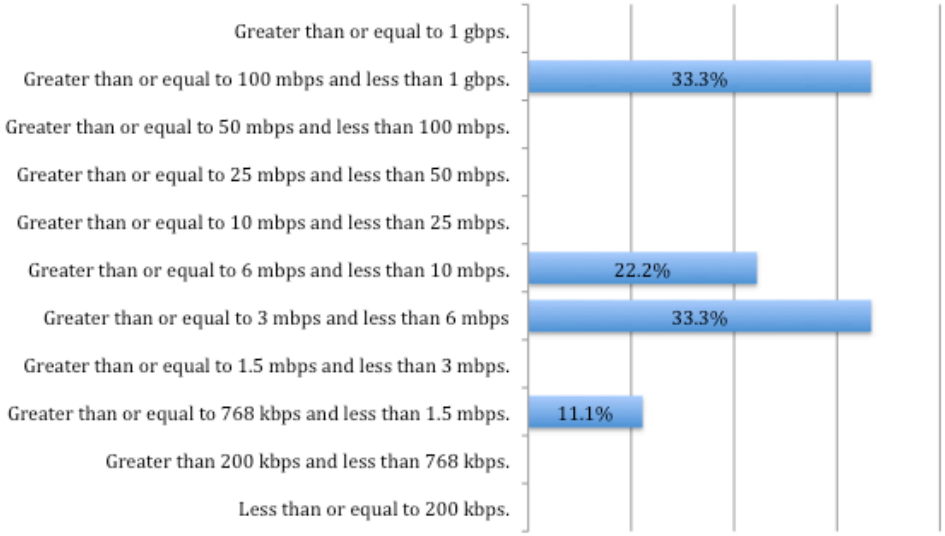


Figure 6. Speed of Broadband Connection

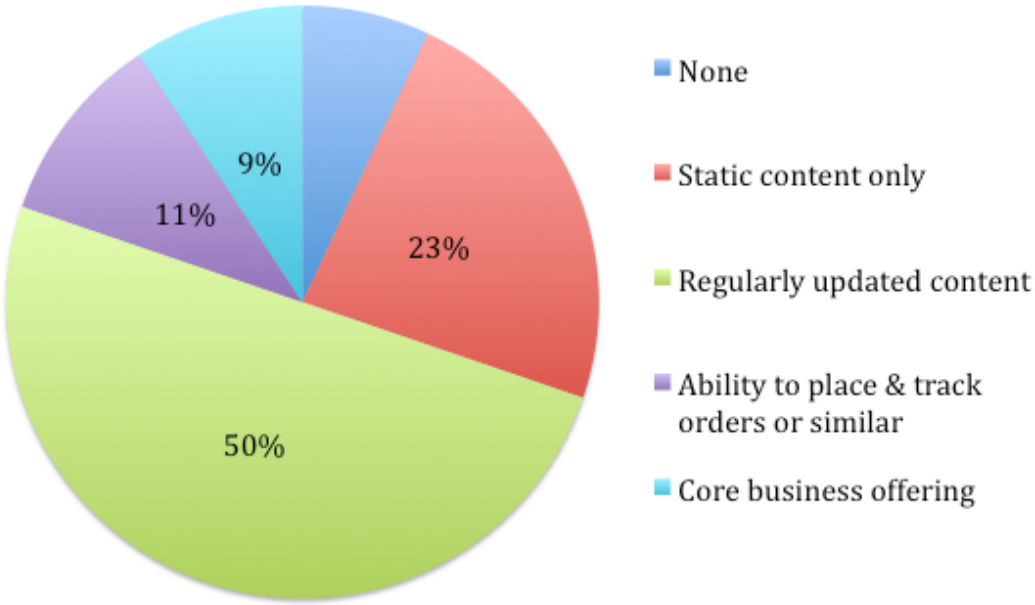


Figure 7. Website Functionality

Eighty-eight respondents answered the question about having a website. Six of those said their organization had no website. Half of respondents said their organization's website included regularly updated content, as illustrated in figure 7. Just over 10% have ability to place and track orders or similar functions, and just under 10% reported that their websites were a core business offering. Nearly a quarter had websites with static content only. And, seven percent of respondents—who likely represent the most tech-savvy organizations in the region—said their organizations have no website.

Table 14. Importance of website functions

Website function	*Not important*	*Not sure/ no opinion*	*Somewhat important*	*Very important*	*Absolutely necessary*
Others learning about, finding, and contacting your organization	4%	5%	17%	21%	35%
Building and maintaining customer/client/citizen relationships	6%	9%	15%	20%	32%
Collecting revenue, selling, or providing a value-added service	18%	7%	20%	18%	18%
Coordinating business activities and/or operating your organization	13%	5%	12%	22%	28%
Averages	**10.4%**	**6.4%**	**15.9%**	**20.1%**	**28.4%**

Table 14 shows how the 82 respondents that said they had a website felt about the practical importance of their websites. On average across all functions, the largest percentage of respondents said their websites were absolutely necessary. Nearly three quarters indicated that their websites were very important or necessary for others to find their organizations, and over half said the same about use the web to build and maintain relationships with others. Interestingly, this function had the largest portion of respondents unsure about its importance. The function that appears to be the least important is conducting actual transactions.

Digital technology projects and purchases

The survey asked about major digital technology projects and purchase, past, current, planned, and future. The greatest number of responses came from government agencies, but the most substantive responses came from manufacturing and education sectors. There were also quite substantive responses from finance & insurance, information, and professional, scientific & technical services sectors. We also had relatively strong response from the arts, entertainment, and recreation sector.

Generally, respondents identified more past and current projects/purchases than those being planned or considered for the future. Hardware was mentioned much more than software, infrastructure, or business functions. Eighty-two percent of past projects and 86% of current projects involved hardware. In contrast, 35% of

past and 51% of present projects involved software. The proportion of software to hardware is much higher for planned projects. Network infrastructure, including broadband and wi-fi, were part of 18% of past projects and 36% of present projects. Particular business functions were most prominently mentioned in conjunction with future projects or purchases. The business functions identified by respondents were billing, customer, financial, marketing, personnel/HR, and purchasing. Seventeen percent of responses indicated there were no plans or future technology project/purchases being considered.

Past projects were overwhelming focused on telephones. Internet access and websites were also common past projects. Many respondents indicated they were currently or recently focused on computer hardware. Servers were especially prominent in current projects. Handheld/mobile devices were notable in current and planned projects. Cloud computing and storage was the one technology that stood out as something being considered for the future.

Education

Schools are upgrading their network capacity and connectivity, but most of their focus appears to be on student information systems, learning management systems, and classroom technologies. Many have recently upgraded their phone systems and servers. Their planned and potential future projects are primarily about continuing to expand network accessibility (wi-fi) and capacity and deploy more technology in classrooms. Generally, the respondents seem to be moving away from servers to cloud computing.

Government

Public agencies appear to be very focused on management information systems. Basically, they are looking for software to operate better. They have upgraded computers, phone systems, and servers, or are doing so currently. Their plans are to move toward more online services, including social media, streaming media (video of meetings and surveillance, specifically). Respondents from the government sector called for faster and more ubiquitous broadband, for standards and strategy to keep up with technology investments by business & industry, and collaboration (specifically, joint procurement) to accomplish these goals.

Healthcare

Respondents from healthcare hardly mentioned hardware or networks. Their focus appears to be on software for tracking patients and financials (including filing insurance claims and tracking inventory). They are also continuously upgrading their websites, and looking at cloud computing.

Manufacturing

Respondents indicated that manufacturers have recently upgraded much of their network infrastructure, phone systems, and computers, including servers. Their focus is on technologies for tracking and automating their processes. Enterprise resources planning and computer numeric controlled production are prominent projects. Systems for inspection, feedback, and data acquisition were unique to this

sector. That said, manufacturing respondents had very broad, comprehensive set of current and planned projects. They are investing in improved office productivity software and software to analyze and support all aspects of their businesses. Only respondents from this sector mentioned integration and mobility as technology projects/purchases. Manufacturers need more high-reliability, high-speed network access. Also, unlike most other sectors, these respondents clearly expressed needs for technical skills.

Tourism and related

This analysis includes the following sectors: Arts, Entertainment, and Recreation (2-digit NAICS code, 71), Agriculture (11), and Information (51). Like others, respondents from these sectors have recently upgraded their phone systems. Their plans are more oriented toward upgrading computers. And, they are more focused on basic communications, customer-facing transaction systems (such as point of sale, publishing, streaming video, and ticket sales), and network connectivity, particularly in remote/rural locations.

Other sectors, small business

We had relatively robust responses from Finance and Insurance (2-digit NAICS code, 53), Professional, Scientific, and Technical Services (54), and Other Services (81), particularly Chambers of Commerce. There were also a few responses each from Construction (23), Real Estate and Rental and Leasing (53), Retail Trade (44-45), Utilities (22), and Wholesale Trade (42).

These sectors are quite diverse, but they are unified by a current technology focus on software to track assets, customers, and money. Like many others, they have recently upgraded their hardware, particularly phones and servers. Like manufacturing, several respondents in these sectors mentioned broad, comprehensive technology projects, and mentioned integration. They seem to also be unified in moving to online services and software, including mobile, to get in front of, engage, and take money from customers. At the same time, they seemed more likely to mention printing (including both “old” faxing and “new” 3D printing) than other respondents.

Uses, Impacts, and Barriers

Just under a third of respondents indicated that that their organizations had used IT to increase efficiency, improve processes, and make better decisions.

What does all of this spending mean for the respondents’ organizations? Generally, the greatest impacts for respondents have been increases in productivity, as shown in table 15, especially for administrative functions. At least a quarter of all respondents saw productivity increases in all areas of their organizations. Use of IT in sales & marketing did the most to increase revenue, and use of IT in hiring & purchasing was most effective for reducing costs. No negative impacts from IT use were reported.

Table 15. General impacts of IT

Organizational Function	*Negative Impact*	*No Use*	*Reduced costs*	*Increased productivity*	*Generated new revenue*
Administration & finance, including IT	0.0%	12.1%	22.0%	58.2%	7.7%
Hiring & purchasing	0.0%	31.5%	32.6%	28.1%	7.9%
Production & distribution	0.0%	31.0%	21.8%	33.3%	13.8%
Sales & Marketing	0.0%	21.1%	12.2%	26.7%	40.0%
Design & engineering, including maintenance	0.0%	44.8%	19.5%	27.6%	8.0%
Average	**0.0%**	**28.1%**	**21.6%**	**34.8%**	**15.5%**

This data shows where there are opportunities, as well as where the impacts were. Well over a quarter of all respondents saw no use of IT in at least one functional area of their organizations. In particular, almost half of respondents reported no use of IT in design, engineering, and maintenance. Nearly a third of respondents reported no use of IT in hiring & purchasing and in production & distribution. The results also suggest some opportunities for more sophisticated understanding of IT impacts and strategy. For example, does use of IT in sales & marketing really generate new revenue, or does it simply reduce costs of sales and allow sales personnel to cultivate more prospects? Or, is there really no use of IT in production & distribution, or do the organizations just tend to arbitrarily separate IT from automation? These questions may seem like splitting hairs but the answers can have big implications for increasing competitive advantage and returns on IT investment.

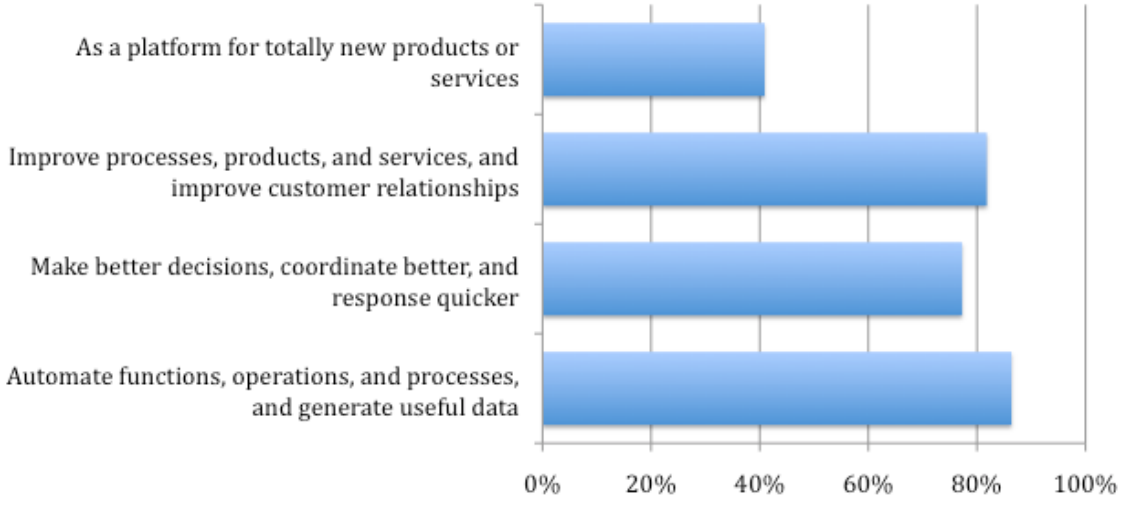


Figure 8. General uses of IT

We asked a similar but more general question about the general uses of information technology. At this point in the survey there were 88 respondents. Of these, as illustrated in figure 8, over 80% of respondents indicated that their organizations used IT to automate processes and generate useful data, and to improve products and improve customer relationships. Just under 80% indicated using IT to improve decisions and responsiveness. While the differences between these responses were 3% to 4%, they suggest that organizations are not fully capitalizing on intelligence generated by IT application. Less than half were using IT as a platform for new products and services.

The major barriers to greater use of IT for respondents were costs and difficulty of investing. The "soft costs" of digital technology appear to be nearly as much of an issue as the hard costs. Characteristics of the new technology—particularly need for upgrades and greater expertise—were clearly seen as barriers, as were organizational issues related to older technologies. Lack of acceptance and unclear business benefits can be minor barriers. But it does not appear that lack of management support or risks of IT creating inefficiencies are barriers for respondents.

Table 16. Barriers to IT investment and use

Issue	*Major barrier*	*Minor barrier*	*Not a barrier*
Investment costs too high; difficulty financing	55%	38%	8%
Greater know-how required from IT staff	23%	51%	27%
Continual need for upgrading	21%	49%	29%
Difficulty of replacing existing systems	20%	46%	34%
Lack of acceptance by personnel	9%	29%	61%
Unclear benefits or business value	7%	35%	58%
Lack of commitment from management	7%	16%	77%
Risk that IT leads to inefficiency	4%	14%	82%

One of the last questions on the survey was about the availability and importance of digital economy resources that had been identified by regional leaders, as well as state and national policy-makers. The results, summarized in table 17, are revealing. Respondents were effectively unanimous is the opinion that broadband is both important and available. In contrast, a majority felt that a digitally literate workforce was only somewhat available, while a strong majority indicated that it was important. The results were similar for expertise and solutions: Well over half felt it very important but about half felt it was only somewhat available. Technology financing had the largest percentage of respondents that felt it was not available, but also the largest percentage that felt it was not important. Seventy-seven percent indicated that financing was at least somewhat important, while 27% indicated that it was not at all available.

Table 17. Availability and Importance of IT Resources

	Very	*Somewhat*	*Not at all*	*Not sure*
Broadband availability	74%	19%	5%	2%
Broadband importance	78%	16%	2%	4%
Digitally literate workforce availability	42%	55%	0%	4%
Digitally literate workforce importance	65%	31%	1%	4%
Technology financing availability	20%	43%	27%	10%
Technology financing importance	43%	34%	20%	4%
IT solution & expertise availability	40%	49%	7%	4%
IT solution & expertise importance	56%	34%	6%	4%

Technology Partner Interests

Conclusions

Technology companies are most likely to partner with and support the Northwest Georgia Regional Commission on efforts to educate key decision-makers. These efforts will get the most support if they are about software to support core business functions, and if they are about moving these functions to the web. Regional tech companies will be most supportive of efforts focused on physical assets and facilities, whereas companies from outside the region will be more supportive of wholly online assets and functions.

The Regional Commission should consider undertaking pilot projects, conferences or workshops, and consultative services in partnership with technology companies. While broadband infrastructure, technology financing, and workforce development efforts are critical to the region's digital economy, it is unlikely that technology companies will put much into these efforts.Technology companies represent a critical element in growing northwest Georgia's digital economy. Essentially, we want technology companies as partners to promote and support use of digital technologies. We convened two meetings with technology company representatives—one in Atlanta and one in Rome—to identify their areas and levels of interest. Fifteen companies, including major companies like Cisco and IBM, attended the session in Atlanta, and 13 company representatives attended the session in Rome.

Table 18. Tech Partner Session participants

Atlanta	*Rome*
▪ A Deeper View, LLC ▪ Abacus Solutions ▪ BT Conferencing ▪ Cisco ▪ Club E ▪ DesertedRoad & Accipion ▪ GESW ▪ IBM ▪ In-terface ▪ Inner City MD-TV ▪ Jive Software ▪ Key Bridges ▪ SparkMarket ▪ TruVista ▪ Unified Systems Management	▪ AVFN, LLC ▪ Cunningham Dynamic Legal Services LLC/Legalshare, Legalshield ▪ ETC Communications ▪ GeoSolve Consulting, Inc. ▪ JBM Office Solutions ▪ Morse Communications ▪ Parker Fibernet, LLC ▪ Petz Enterprises, LLC/Enived Tech, LLC ▪ Synfone ▪ TENDO Technologies ▪ Trenton Telephone ▪ VC3 ▪ Windstream

During the technology partner sessions, we informed participants about the digital economy planning process and it's goals. We also asked for their feedback on sectors, technologies, and tactics we might use to achieve the plan's goals. While this is not definitive information, it provides a good sense of how and where technology companies might be willing to be involved in implementing the region's digital economy plan.

Sectors

The sector of greatest interest to technology companies, in both Atlanta and Rome, was education. The companies that attended the Atlanta meeting also had major interest in manufacturing, and in small business. They had minor interest in public works and healthcare. Companies at the Rome session also had minor interest in local government and healthcare.

Table 19. Technology interests of potential technology partners

Atlanta companies	*Rome companies*
1. E-commerce, particularly for small businesses and non-profits	1. Asset management and tracking
2. Business intelligence and customer relationship management, particularly for local government	2. Digitization of paper records, document management
3. Executive/leadership technology know-how/strategy	3. Web development, particularly integration with other applications, content management, and "web 2.0"
4. Workforce or training for any of the above	4. Access control and authorization (physical/facilities and virtual/network)
5. Digital media	5. Data storage, management, and analytics, including auditing and e-discovery
6. Process automation and control systems, including logistics and robotics	6. Network access, transport, and value-added services
7. Web development, particularly integration with other applications, content management, and "web 2.0"	7. Business intelligence and customer relationship management, particularly for local government
8. Information/internet security	8. Process automation and control systems, including logistics and robotics
9. Asset management and tracking	9. Executive/leadership technology know-how/strategy
10. Digitization of paper records, document management	10. Information/internet security

Technologies

Overall, the tech companies have the greatest interest in web development. Other technologies of top interest to all the companies were:

- Asset management and tracking
- Digitization of paper records, document management
- Business intelligence and customer relationship management, particularly for local government
- E-commerce, particularly for small businesses and non-profits
- Executive/leadership technology know-how/strategy
- Process automation and control systems, including logistics and robotics

Table 19 lists other technologies attendees at the Atlanta and Rome sessions identified as of interest to their companies.

Tactics

The companies were asked about the level of support for various tactics. The digital development tactics of greatest interest to tech companies overall were (1) demonstration projects with pilot communities, (2) a few large, multi-topic conferences, focusing on ideas and information, and (3) objective, independent technology investment/strategy advising. Generally, the companies at the Atlanta session expressed greater interest in the tactics than the companies that attended the session in Rome.

Three tactics identified through the process as important to digital development that were not of interest to the tech companies were basic digital literacy training, network infrastructure development, and technology financing programs. Companies at the Rome session were somewhat interested in digital literacy training. But technology financing was of little interest to companies at either session. There was even less interest expressed in network infrastructure projects, including fiber in major commercial & industrial areas and public wi-fi. (In contrast, there was reasonably strong interest at both sessions in network access, transport, and value-added services.)