Making it Count: Applying Science to Support Universal Broadband

Sheila Martin

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This special issue presents a series of papers resulting from a two-conference series about closing the digital divide, especially for rural areas. Supported by a conference grant from the USDA National Institute for Food and Agriculture (NIFA), the conference was originally framed to ask whether there was a relationship between demand for broadband to enable smart agriculture and the availability of broadband for nearby rural communities. At a time when national, state, and local governments were expending significant resources to provide or incentivize broadband availability to rural communities and their outlying farms, it seemed critical to understand how farmers' demand for broadband might complement the provision of broadband to rural communities—sparking a virtuous cycle of higher agricultural productivity and increased adoption among consumers and other rural industries, leading to greater rural prosperity.

The onset of the COVID-19 pandemic forced the planning committee to rethink the strategy for surfacing and addressing key research and Extension questions. At the same time, the pandemic shone a very bright light on the digital divide and its implications for those without the benefit of broadband connectivity, digital tools, or digital skills. We changed our plans for both the structure and focus of the conference, highlighting the importance of broadband connectivity for broadly shared prosperity and the importance of using good information to guide policy choices and evaluate programs and funding.

We held two virtual meetings: The first focused on surfacing important questions for researchers and Extension professionals, and the second presented papers that had been developed to address those questions in the intervening months. We also prepared a literature review in advance of the first meeting to offer conference participants an understanding of the current state of the literature related to these issues. The first

Articles in this Theme:

- **The Broadband Serviceable Location Fabric, Rural America, and Agriculture**
  Christina Biedny and Brian E. Whitacre
- **Informing Broadband Policy Decisions with Better Data**
  Christina M. Sanders, Michael J. Gaffney, Debra Hansen, and Monica Babine
- **Integrating Research and Extension to Improve Community Participation in Broadband Projects**
  Casey Canfield, Sarah A. Low, Christel Gollnick, and Debra Davis
- **Innovation and Digital Connectivity: Comparative Policy Approaches for Connecting Rural Communities in the United States and Canada**
  Helaina Gaspard and Paul Manuel Aviles Baker
- **What Does COVID-19 Mean for the Workplace of the Future?**
  David W. Hughes, David Willis, and Harry Crissy
- **Federal Funding Challenges Inhibit a Twenty-First Century "New Deal" for Rural Broadband**
  Jamie Greig and Hannah Nelson

meeting was structured around four themes: targeting investments, building partnerships, advancing technology, and building a digital-ready workforce. At the conclusion of this meeting, several key research and Extension questions were identified.

The visibility of the digital divide during the pandemic drove unprecedented investments in rural broadband. Recent federal investments include the Broadband

Infrastructure Program, the Tribal Broadband Connectivity Program, and the Connecting Minority Communities Program, all introduced by the Consolidated Appropriations Act of 2021. These programs were added to the existing suite of broadband programs, recently detailed in a publication of the Internet Society (CTC Technology and Energy, 2021).

In addition, President Biden signed the bipartisan $1.2 trillion Infrastructure Investment and Jobs Act into law on November 15, 2021. The package includes $65 billion for broadband projects to close the digital divide, improve internet affordability, and improve service to low-income customers, with much of the money directed toward states. Other bills targeted at the digital divide are still pending in Congress, including H.R. 1783, the Accessible, Affordable Internet for All Act, which authorizes over $94 billion to ensure unserved and underserved communities have affordable high-speed internet access.

While adequate funding to close the digital divide is long overdue, these new programs pose questions about how we might ensure that these funds are used most effectively for broadband adoption and uptake for the greatest number of currently unserved and underserved people. The papers address this broad question through the following topics:

- Data and analysis to inform policy recommendations: What data are needed to accurately assess the state of the digital divide? How can better data contribute to policy and program design to ensure that investments that will reap the greatest returns for communities?

- Data and methods to support broadband program evaluation: What information should agencies collect to assess the effectiveness of new programs and funding? What models or evaluation methods are best suited to the task?

- Federal-state policy and funding interaction: As federal funding and policy changes affect incentives for broadband provision, how might state policies and funding impact the effectiveness of these policies and funding mechanisms? What processes and programs can be engaged in local communities to meet end-user needs?

- Labor market effects and response: How will rural broadband funding and access affect the demand for workers with specific skills in the short term (telecom equipment manufacturing and infrastructure buildout), medium term (providing businesses and households access), and long term (as we move toward adoption)? What investments are required to meet those needs and education assets are best positioned to meet them?

- Broadband business models: What innovative business models, partnerships, and implementation tactics demonstrate the capacity to accomplish universal broadband access and adoption given the increase in federal funds? What changes in community mindsets need to happen to move the needle on their willingness to pursue funding?

Biedny and Whitacre examine the information necessary to plan potential investments to determine where they might be most effective and to assess the effectiveness of new programs and funding as they are rolled out. Specifically, they explore the problem of internet availability data. A common complaint among researchers, policy analysts, and those working toward more equitable access is the lack of quality data about exactly where broadband is available. The most-used data source is derived from the Federal Communication Commission's (FCC's) Form 477, as reported in the annual Broadband Deployment Reports (FCC, 2021). Biedny and Whitacre articulate the well-known weaknesses of these data. They discuss the creation of a "broadband serviceable location fabric" (BSLF), which is being created to address these deficiencies by showing all locations where broadband *could be* provided. They evaluate the first steps being taken to create this data by examining preliminary BSLF data for Oklahoma.

Sanders and Gaffney share the results of an effort to correct the inaccurate data published by the FCC. The Stephens County/Spokane Tribe Washington Broadband Access Team (BAT) led an effort to collect data used to challenge the FCC data published for Stephens County and the Spokane reservation. The BAT, coordinated by Washington State University Extension with participation by state, local, regional, tribal, and congressional representatives, already had a long history of working together on broadband planning and access. They developed and implemented a survey of residents and speed tests to establish where internet services were available, the speed of the service, how services were used, whether there was interest in additional internet services, and the barriers to obtaining adequate service. Their findings were used to inform a state legislative package that set speed and service standards, established capacity at the state level to close the broadband gap, and funded additional BATs across the state. Their case study demonstrates how improved information can drive changes in policy and funding in the areas most in need of additional services.

Canfield, Low, and Gollnick illustrate the power of participatory research methods and the role of Co-Operative Extension in advancing important broadband goals in rural communities. In the context of expanded federal funding to state governments, the paper demonstrates the importance of community participation in broadband research and planning to ensure that the

funding is used to best meet the needs of the local community. It also illustrates the power of strong partnerships across state, local, university, nonprofit and internet service providers to address broadband needs and service gaps. Partnership between county-based and campus-based university personnel also play a key role in strengthening community participation in research, thereby improving the policy relevance and its potential benefits.

Gaspard and Baker take a US-Canadian comparative approach to understanding the impact of local demographic and geographic characteristics on rural broadband challenges, the role of local intermediaries, and the menu of policy prescriptions and their effectiveness. They provide evidence that in both countries, intermediaries are essential for providing information, filling gaps, connecting and leveraging resources, and generating the scale necessary to incentivize provision. They argue that universities can and have been effective as intermediaries, playing these roles to connect rural residents to broadband. They point to Virginia and North Carolina as examples of universities serving these intermediary roles. In Canada, they use the example of Southwestern Integrated Fibre Technology, a publicly funded multi-jurisdictional coalition, as an example of an intermediary that is providing the data, technical expertise, local context, and local participation to ensure that the solutions deployed locally are appropriate to fill local needs. The BATs operating in Washington State and described in the Sanders and Gaffney paper are also a great illustration of universities as broadband intermediaries.

One key issue that emerged as we proceeded with this project during the pandemic is that of telework. After offices shut down to obey COVID restrictions, many employers quickly put in place the policy and infrastructure to allow extensive telework. However, not all occupations, workplaces, or households are easily converted to telework. Even where broadband is available, other barriers to telework exist. You simply can't build a building, harvest food or fiber, or produce most goods remotely (although digital technologies are making some aspects of this work more remote friendly; for example, see Immerman, 2021). A study by Gallardo and Florida early in the pandemic showed that rural counties were more vulnerable to job losses due to inability to convert to remote work, either because of occupation, industry, or lack of broadband (Gallardo and Florida, 2020). As we close broadband gaps and become more used to telework, what permanent changes might emerge in the workplace?
Hughes, Chrissy, and Willis argue that the experience of telework during COVID lockdowns has had permanent impacts on the workforce. They investigated the extent

of teleworking during COVID and found that rural workers were much less likely to telework than urban and metropolitan workers. The factors that influenced the likelihood of telecommuting also included occupation, industry, income, and education. Thus, eliminating broadband barriers will probably not completely erase differences in remote work between rural and urban areas. However, as more rural and metropolitan workers are allowed to work remotely permanently, they may choose to migrate to rural areas, causing a restructuring the rural workforce toward more remote work-friendly jobs. This will only be possible in areas where broadband is available.

Broadband is not the first utility to have struggled to find a viable private market in rural communities. Greig points to the obvious parallels with rural electrification in the 1930s and argues that the rural electric co-operative (REC) model offers the potential to better serve millions of rural residents. He explores why so few rural co-operatives have filled this need. Using data from a survey of RECs, he identifies accessing and managing federal funding as a key difficulty and makes suggestions for how federal agencies might help RECs overcome these challenges.

Questions for the Future

Many issues remain unresolved. We are still interested in the extent to which demand by agriculture might tip the economic equation in favor of broadband provision even in remote rural areas. The BSLF discussed by Biedny and Whitacre might bring to light this potential demand and encourage private providers to invest in agriculture-dominated areas. Similarly, we still don't understand how federal and state funding agencies will use improved data to direct funding and whether it will improve the return on that investment. We do have evidence that intermediaries and collaboration between research and Extension can make a difference for communities working to plan and influence broadband investments and adoption. But the question of whether the current swell of investment will be spent according to communities' expressed needs remains. As more local governments and co-operatives offer broadband, they may be more responsive than private sector providers to local needs. Finally, we predict more people will telework post-pandemic because norms and habits have shifted; however, we don't know where the balance between remote and in-person work will land.

For More Information

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Author Information: Sheila Martin is Strategic Advisor for Economic and Community Engagement, Association of Public and Land-Grant Universities, Washington, DC.