MICHIGAN STATE UNIVERSITY

IPPSR Public Policy Forum | September 27, 2022

MOON - Light

Project MOON-Light

Leveraging High-Speed Technology to Forge a More Equitable Path for Learning and Innovation in Michigan

Presenters:

Joseph Sawasky

President & CEO,
Merit Network

Dr. Johannes Bauer

Professor, Department of Media and Information
Director of the Quello Center for Media and Information Policy, MSU

merit

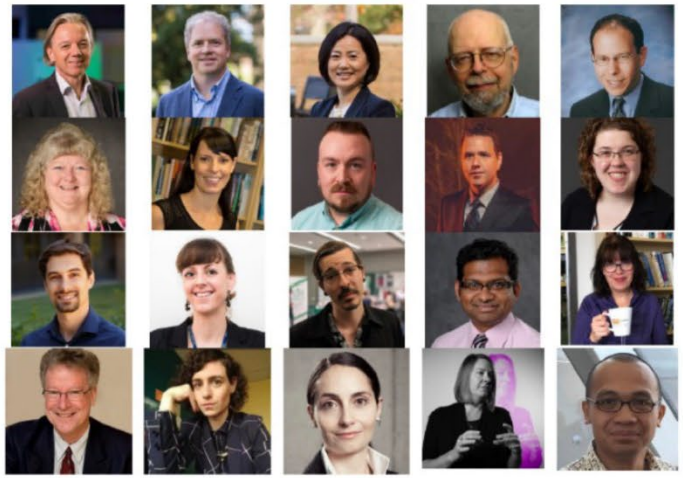
Quello

Center, MSU

https://quello.msu.edu

Established in honor of

James H. Quello
and Mary B. Quello



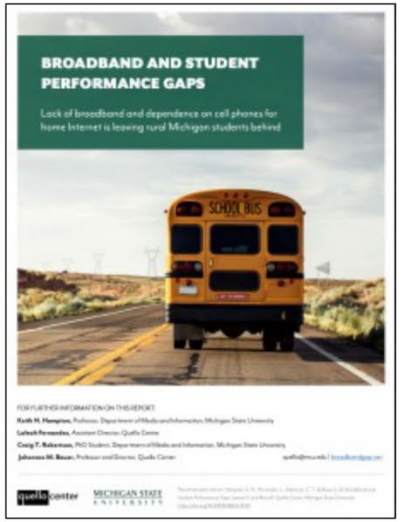
Presently >30 faculty, students and practitioners from ComArtSci, MSU, the United States, and abroad.

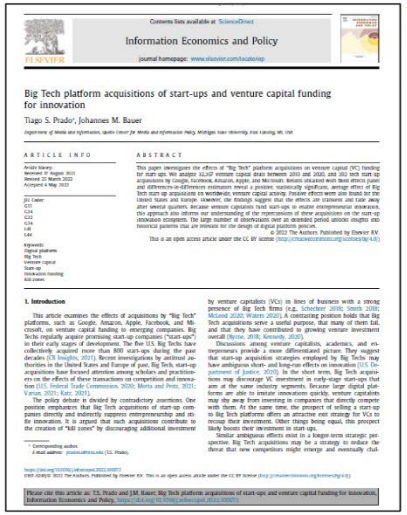
Research, Outreach, Public Service

- **Main research clusters**
- Broadband, digital equity, inclusion
- Social impacts of IT and new media
- Digital innovation and transformation
- Digital economy and platform policy
- **Digital Futures Workshop**
- **Policy briefs, lectures/panels, workshops**
- **See annual reports at** https://quello.msu.edu/academic-year-reports/
- **Sign up for more information at** quello@msu.edu

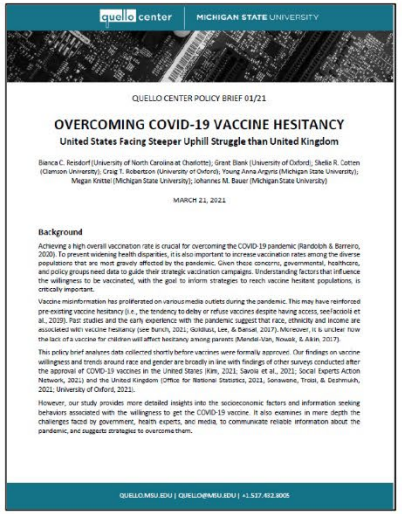

Telematics and Informatics

How variation in internet access, digital skills, and media use are related to rural student outcomes: GPA, SAT, and educational aspirations

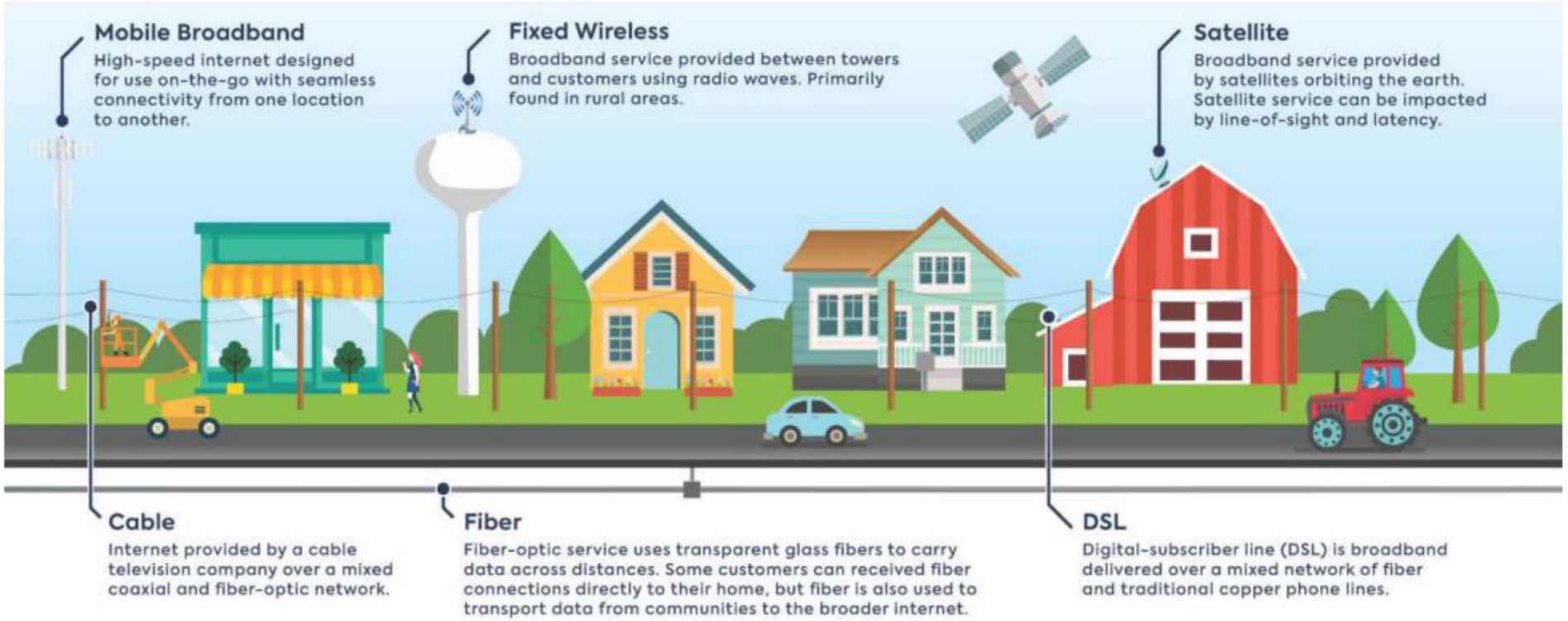



Information Economics and Policy

Big Tech platform acquisitions of start-ups and venture capital funding for innovation



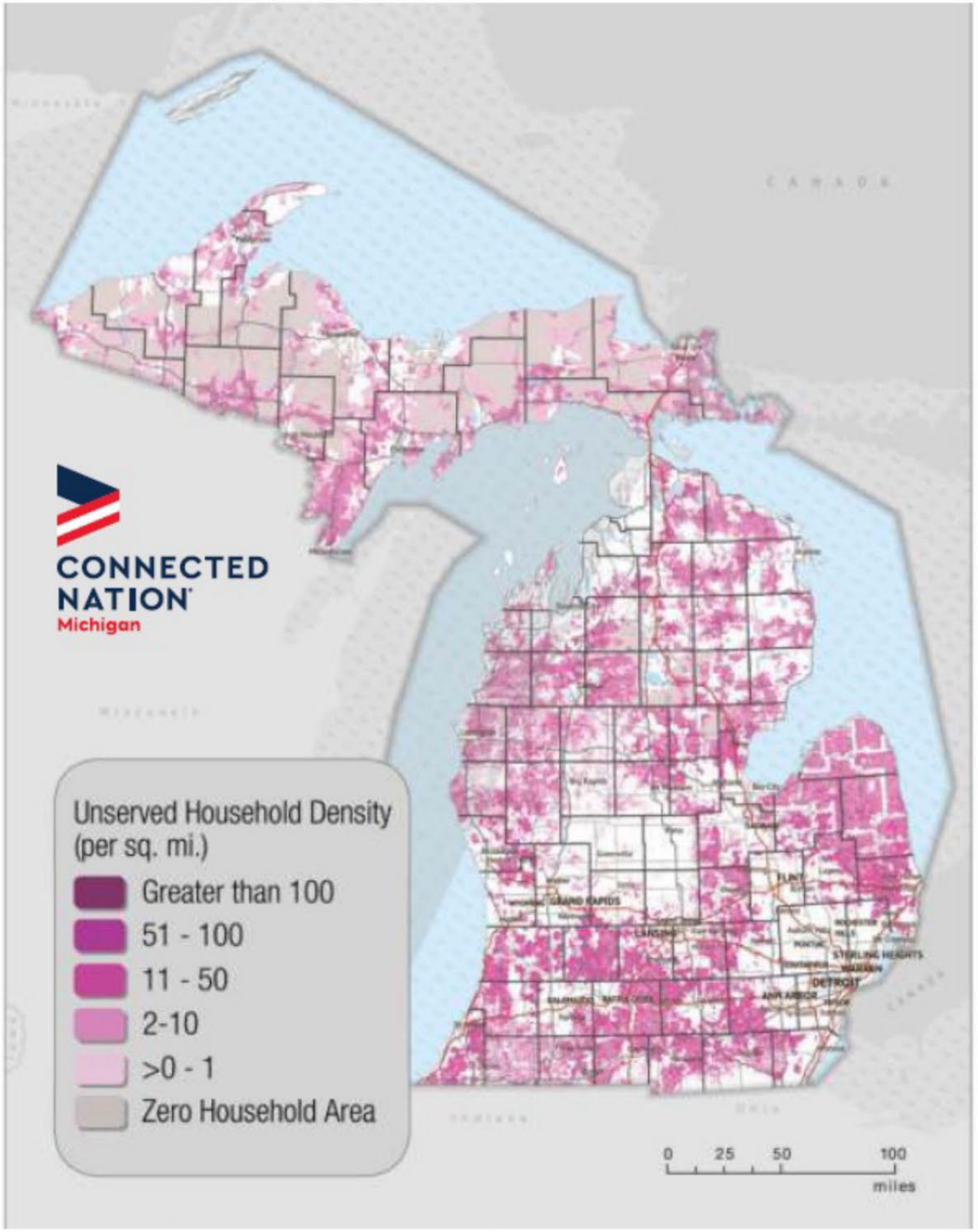
What is Broadband?



Source: 2021 Update to the Michigan Broadband Roadmap, p. 11.

Connectivity Gaps

- Nearly one third of Michigan residents do not have access to a fixed Internet connection at home
- Many residents cannot afford service that might be available
- Michigan ranks 33rd nationwide in terms of connectivity
- These discrepancies have broad social and economic effects

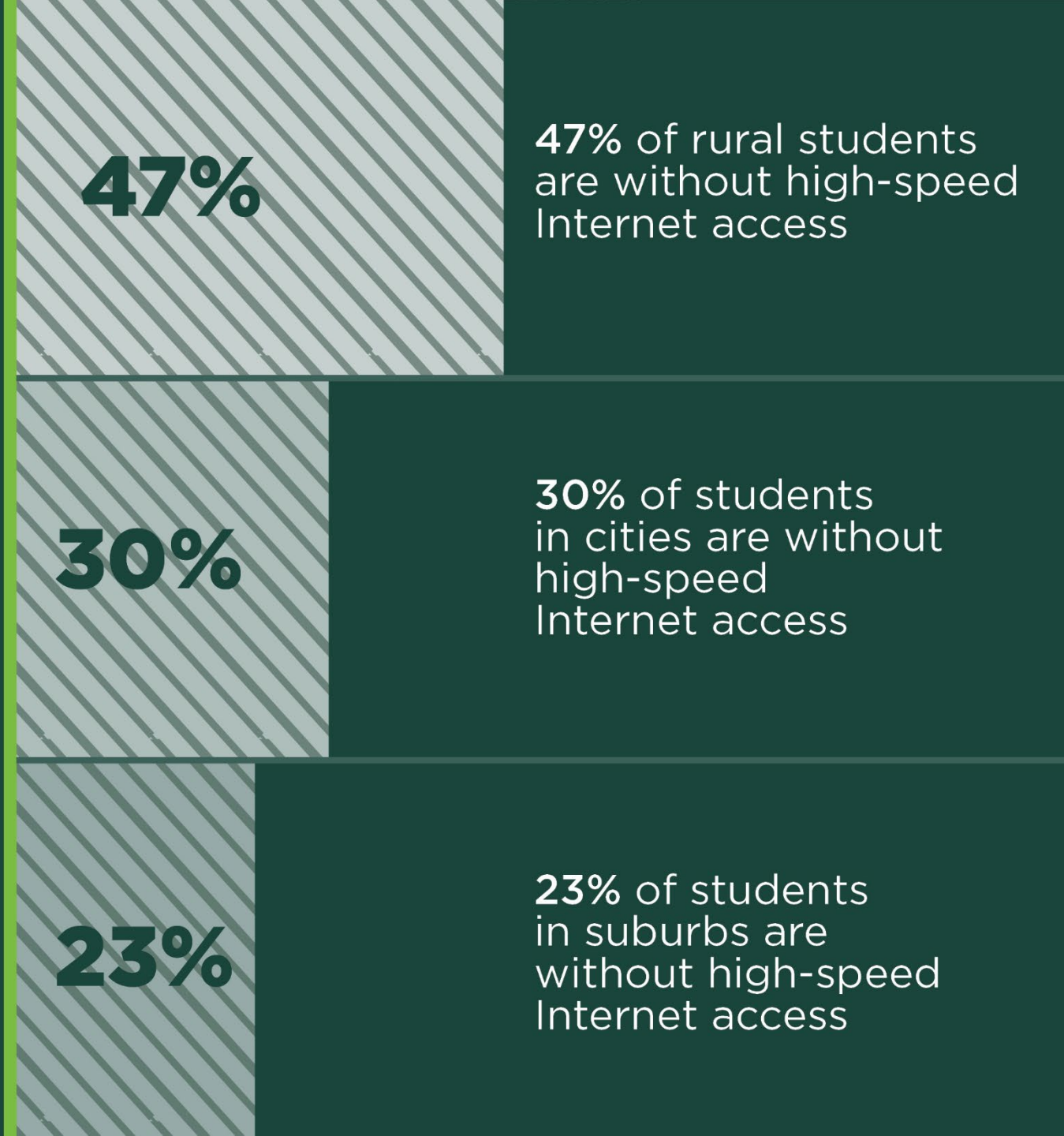


The Homework Gap

Who Has Access

Rural students and low-income students are less likely to have high-speed Internet access at home.

High-speed home Internet access is less common in rural areas, because rural areas are less likely to have an infrastructure to provide broadband Internet access. Students who lack home Internet access are more likely to be rural, low-income and children of parents who do not have a university degree.



Effects on Grades and *Test Scores*

Have Lower Overall GPAs

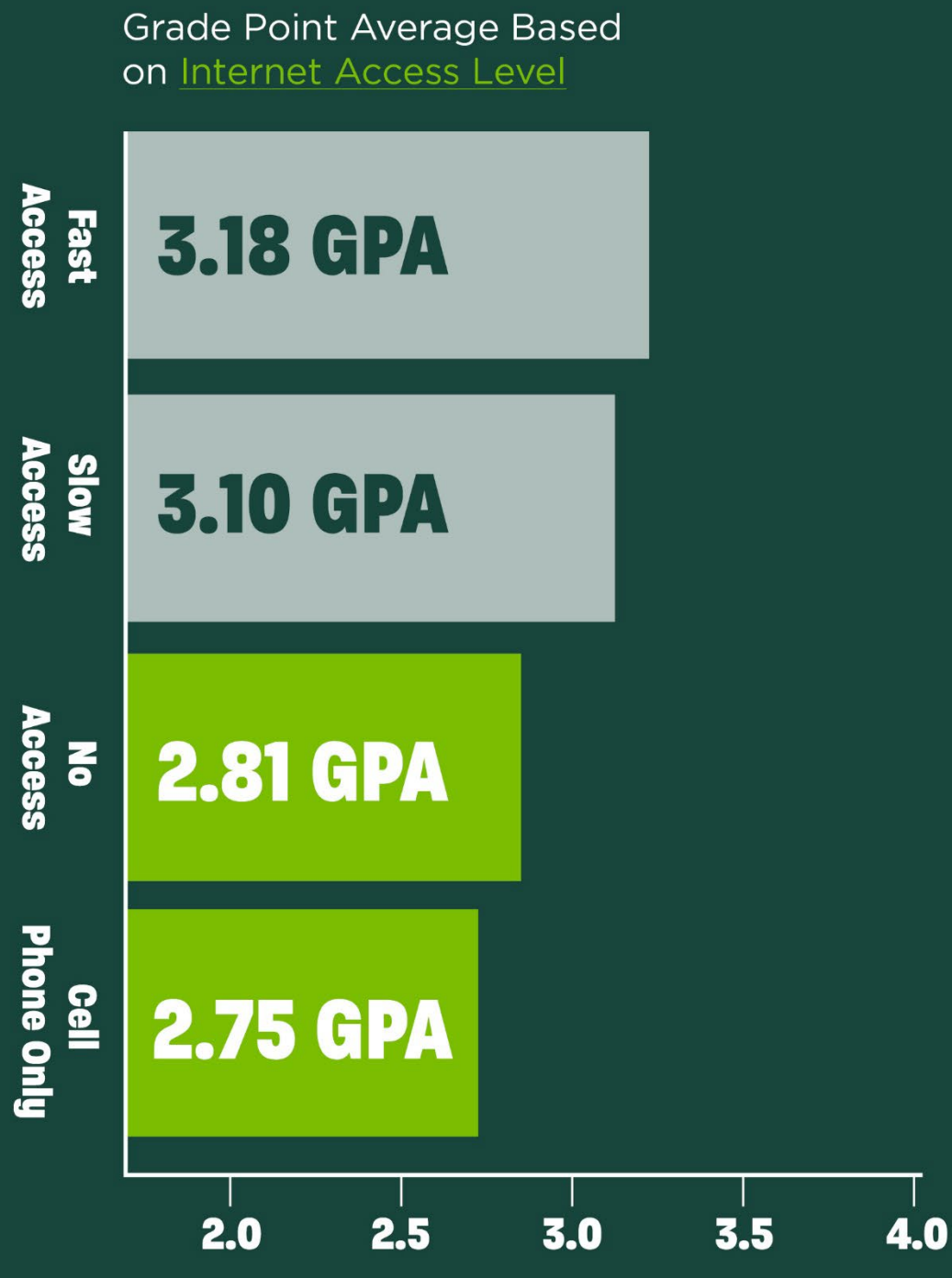
The GPA of students without home Internet access is on average half a letter grade lower in all classes.

Rank Lower on Standardized Test Scores

On average, students who had no Internet access at home, as well as those who relied on a cell phone, scored lower on the SAT/PSAT in reading and writing, math and total score.

Cell Phone Dependent Students Were *Worse Off* Than Students With No Access

This is likely due to constraints such as the size of a screen, data caps, and pre-paid phone plans that expire.



Post Secondary Education and *Career Outlook*

Lower Interest in Post-Secondary Education

Students without high-speed Internet access are less likely to pursue post-secondary education.

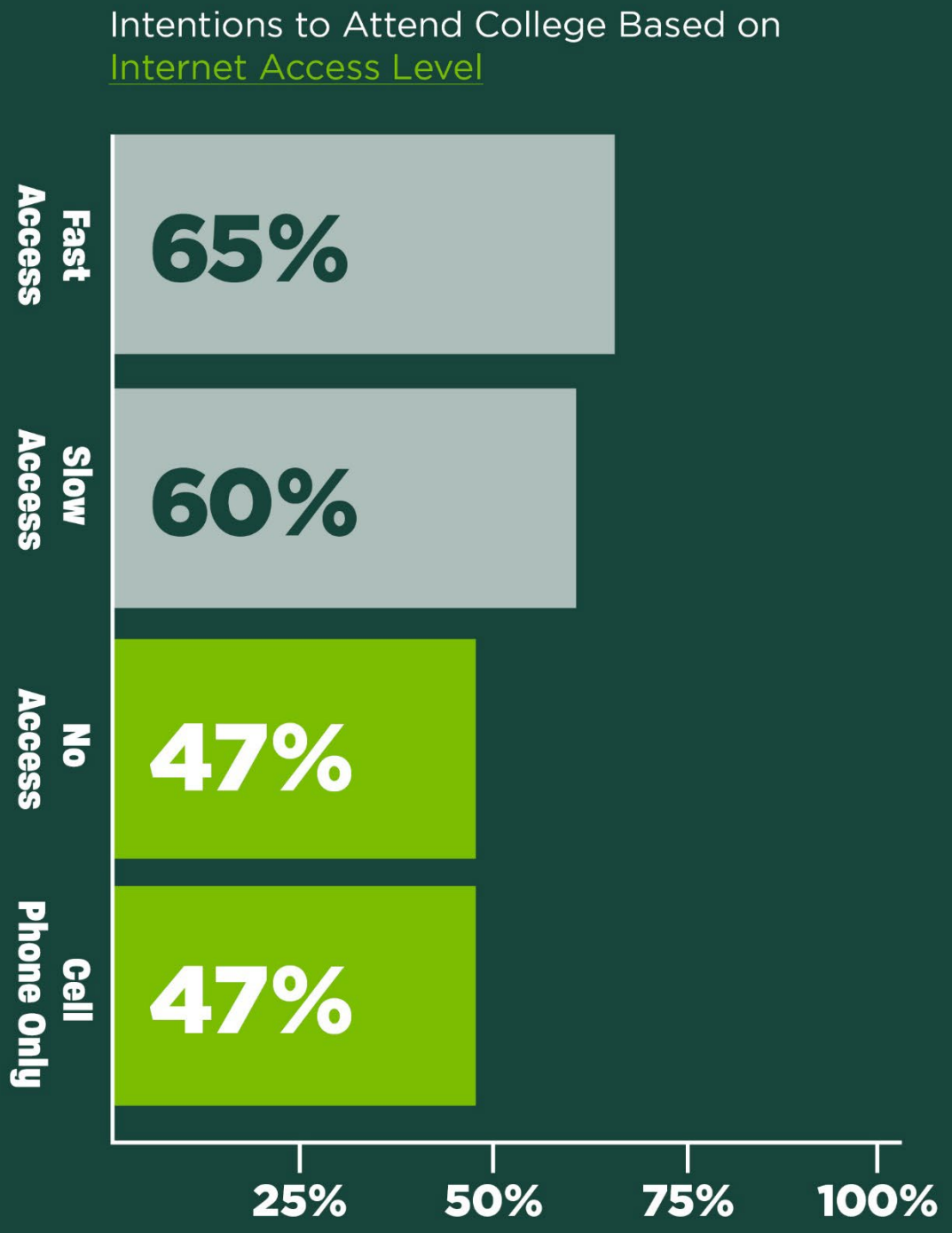
Less Likely to Pursue a STEM-Related Career

48% of those with fast home Internet access want a career in a STEM field, compared to 41% of students who have no home Internet access.

Are Less Likely to Attend College

Students who do not have high-speed Internet access at home, and those with fewer digital skills are less likely to have an interest in attending college or university.

Most students with no, or cell phone only, Internet access at home do not intend to complete any college degree.



Harnessing High-Speed Connectivity For Michigan

Federal, State, and Local Efforts

Federal Programs

- Universal service funding: low income, high cost, anchor institutions (USAC)
- $20B Rural Digital Opportunity Fund (FCC)
- DoC/NTIA programs (e.g., BIP)
- Stimulus programs (e.g., ARRA 2009, ARPA 2021)
- Infrastructure Investment and Jobs Act 2021
- $42.25B Broadband Equity and Deployment Act (BEAD)
- $1B Middle Mile program
- $2B Tribal Broadband program
- $2.75B Digital Equity Programs
- $14.42B Affordable Connectivity Program,

State Resources and Initiatives

- $250M to improve broadband access from American Rescue Plan
- $363M from Rural Digital Opportunity Fund
- $28M from state-level Connecting Michigan Communities (CMIC) grant program
- $36.2M from USDA ReConnect program
- $4.8M from FCC COVID-19 Telehealth grant program
- Planning resources from federal programs to MIHI Office
- Expected $1.5-1.7B from BEAD program

Opportunities & Challenges

Adaptation to next-generation technology

(Fourth level)

As technology evolves, new skills and practices are needed, requires lifelong learning

Uses and outcomes

(Third level)

Requires human-centric design of digital solutions, necessary to capture the full benefits of broadband

Digital skills, literacy

(Second level)

Necessary to utilize available technology for individual and social benefit

Network and device access

(First level digital divide)

Necessary to realize benefits of digital connectivity and to achieving digital equity and inclusion

Potential Benefits

MSU Capabilities and Resources

(Examples)

Area	MSU Capabilites and Resources
Planning and Capacity Building	Center for Community and Economic Development, MSU Extension, National Charrette Institute (NCI) have offered capacity building programs to community and regional planners.
Network and Device Access, Digital Equity	Quello Center and Merit Network have pioneered innovative broadband mapping. With Remote Sensing and GIS (RS&GIS) at MSU they are ready to become a trusted data repository for state broadband data.
Digital Skills and Literacy	K-12 Outreach and Engagement assist schools in building effective technology use in the classroom. EPIC monitors outcomes. Continuing education service allow upskilling and reskilling of workforce.
Uses and Outcomes	MSU is developing innovative technologies in digital health/tele-health, precision agriculture, smart mobility, and advanced manufacturing.
Appropriate Technology, Resilience	Rural Computing Research Consortium (RCRC) develops human-centric technology solutions appropriate for rural areas.

MSU, Merit & MOON-Light

This program, named the Michigan Open Optical Network - Leveraging Innovation to Get High-Speed Technology (MOON-Light), will help address critical infrastructure gaps by enabling technologically advanced, middle-mile fiber optic infrastructure across the state. It will allow interconnecting local Internet service providers (ISPs) to bring affordable, robust, high-speed broadband internet to homes and businesses in Michigan's underserved/unserved population areas.

Merit Network and the MOON-Light Initiative

August 2022

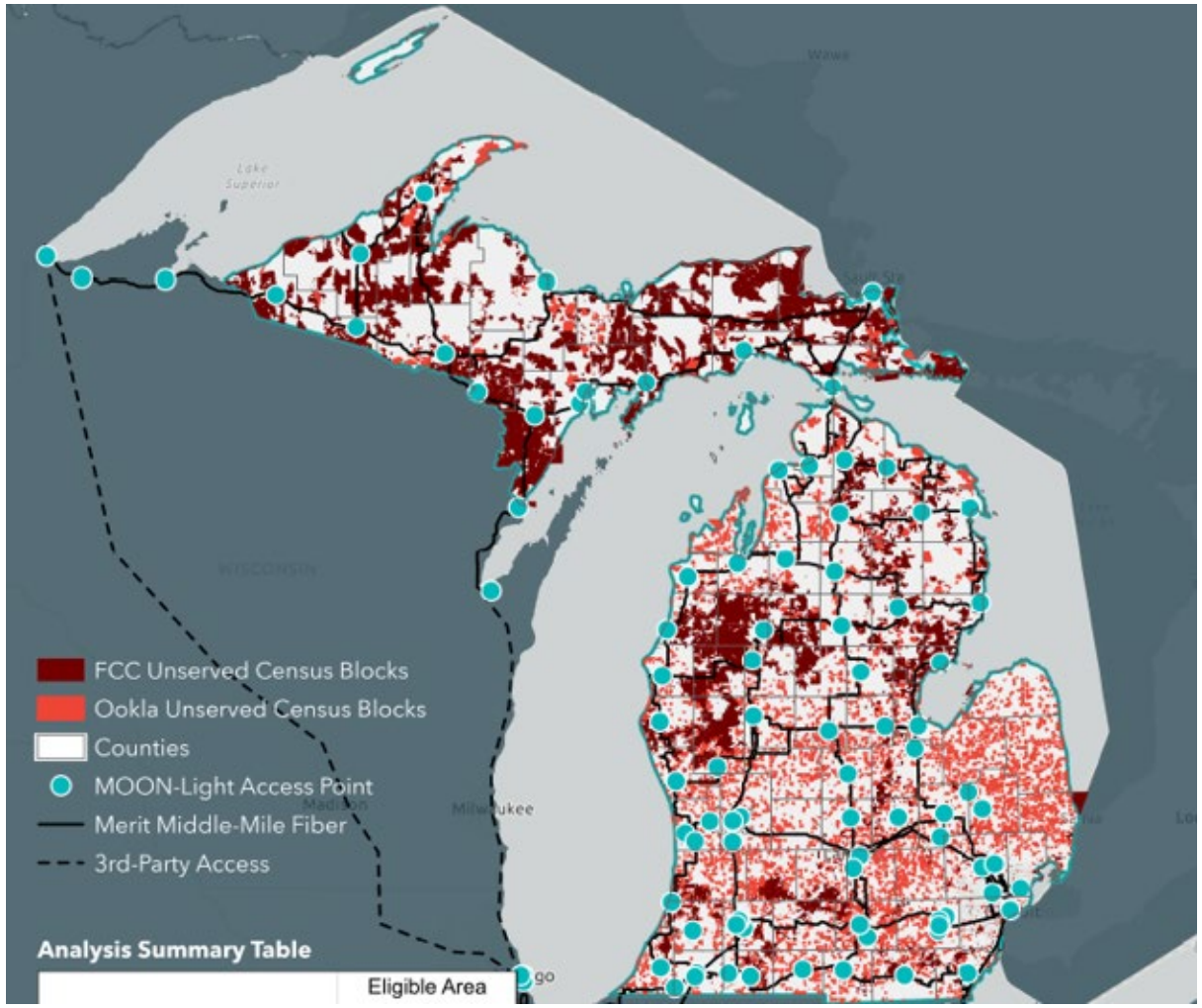
merit

Overview

Why are we here?

- **2018** – Participation on former governor Rick Snyder's broadband taskforce
- **2018** - MSU Quello Center and Merit submit joint recommendations on the value of crowd-sourced broadband surveys to the NTIA*
- Merit launches the Michigan Moonshot initiative
- **2019-2020** – Quello Center's K-12 student performance gap research**
- **2019-present** – broadband survey work for counties across Michigan
- **2022** – NTIA Broadband Infrastructure Program grant to MSU/Merit for MOON-Light

*(Citizen Enabled Advances in Broadband Availability Data, https://www.ntia.doc.gov/files/ntia/publications/quello_merit_commentsdocket_no.180427421-8421-01.pdf)
**https://quello.msu.edu/broadbandgap/



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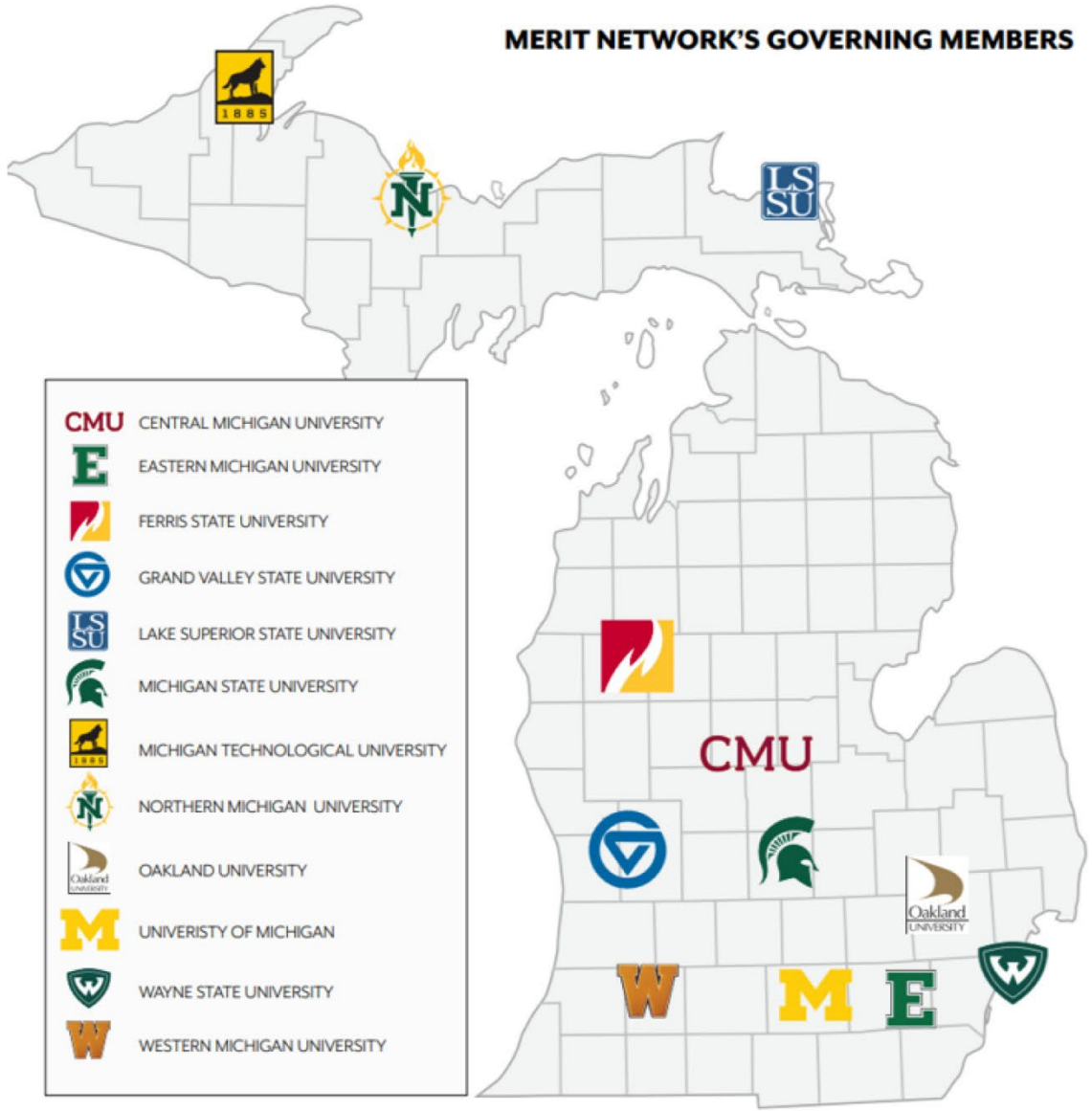
Merit, the longest running R&E network in the U.S., is an **independent non-profit organization** governed by 12 public universities and supported by over 370 affiliate Members and anchor institutions.

Our Members are community-facing organizations from across the **education, library, government, healthcare and non-profit sectors**.



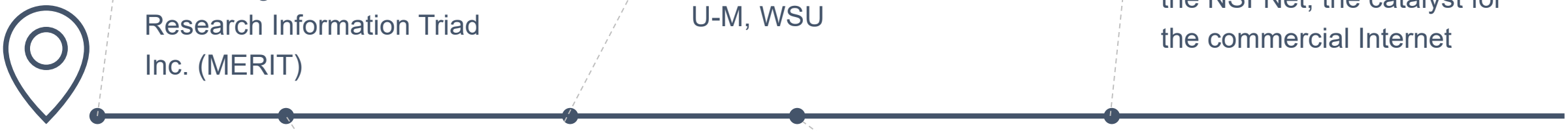
Our Mission

“Connecting organizations and building community.” We provide network, security and community services to member organizations that help make our society a better place to learn, discover, work and live – while upholding the principles of an open internet.

Network · Security · Community

OVERVIEW

MERIT'S HISTORY



1966

Michigan State University, University of Michigan, and Wayne State University form the Michigan Educational Research Information Triad Inc. (MERIT)

1969

The National Science Foundation (NSF) awards funds, matched by the Michigan State Legislature, to initiate the MERIT project

1971

Merit successfully networks mainframe computers at MSU, U-M, WSU

1978

Western Michigan University becomes the fourth Member of Merit, expanding the network beyond the triad.

1987

MERIT, along with IBM, MCI & Michigan Strategic Fund, wins $39 million award to manage the NSFNet, the catalyst for the commercial Internet

OVERVIEW

MERIT'S HISTORY

1996

U.S. higher education institutions create Internet2, Merit becomes an affiliate member of Internet2

2004

Merit & ORION (Ontario Research Innovation Optical Network) sign historic agreement to connect the USA and Canada borders

2010

Merit receives two federal grants to construct 2,287 miles of fiber infrastructure as part of the REACH-3MC project

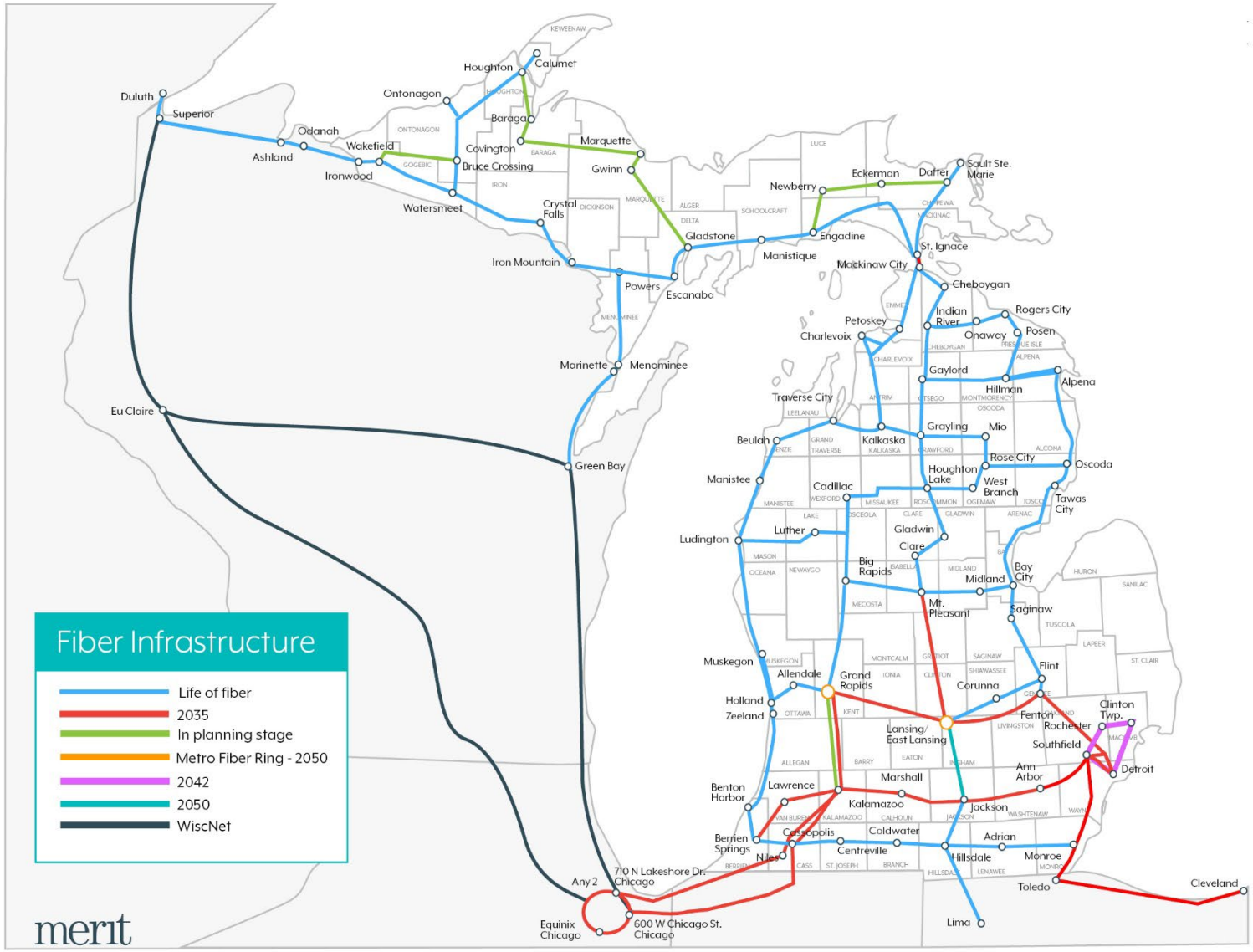
2012

Merit dedicates the Michigan Cyber Range, the first unclassified cyber range.

2014

Merit completes REACH-3MC, expanding fiber backbone by 59% and connecting 143 new community anchor institutions

Merit Infrastructure Network



THE MICHIGAN MOONSHOT

LET'S EXPAND COMMUNITY NETWORKS IN MICHIGAN

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MLAB

MICHIGAN STATE UNIVERSITY

quello center

Michigan Moonshot Pillars →

Data & Mapping Analysis

- Provide communities with expert GIS and broadband support to assist with data collection and mapping, analysis, grant storytelling, and infrastructure planning
- Leverage user-driven data and open source tools to provide accurate, granular household level outputs and visualizations

Education, Resources & Funding

- Share educational materials, host community events, and offer technical assistance to support and empower local leaders and communities to demonstrate tangible progress toward broadband expansion

Infrastructure

- As a statewide network operator, Merit is positioned to assist communities with our infrastructure expertise. We approach this from an agnostic perspective in support of all ownership models, technologies and collaborator arrangements

DATA COLLECTION

As a tool for community, municipal
and educational engagement

Unbiased | Accurate | Granular | Longitudinal

2019		
April	**K-12 Pilot**	
2020		
February	**Washtenaw County**	
July	**Wayne State University**	
2021		
February	**Berrien County**	
July	**Ottawa County**	
Summer	**Calhoun County**	
Fall	**Saginaw Township**	
Fall	**Livingston County**	
Fall	**Benzie County**	
2022		
Spring	**Ingham County**	
Summer	**Eastern Upper Peninsula**	
Fall	**Lapeer County**	
Fall	**Kent County**	

Research

Broadband and Student Performance Gaps

Lack of broadband and dependence on cell phones for home Internet is leaving rural Michigan students behind

Keith N. Hampton, Professor, MSU

LaLeah Fernandez, Assistant Director, Quello Center

Craig T. Robertson, PhD Student, MSU

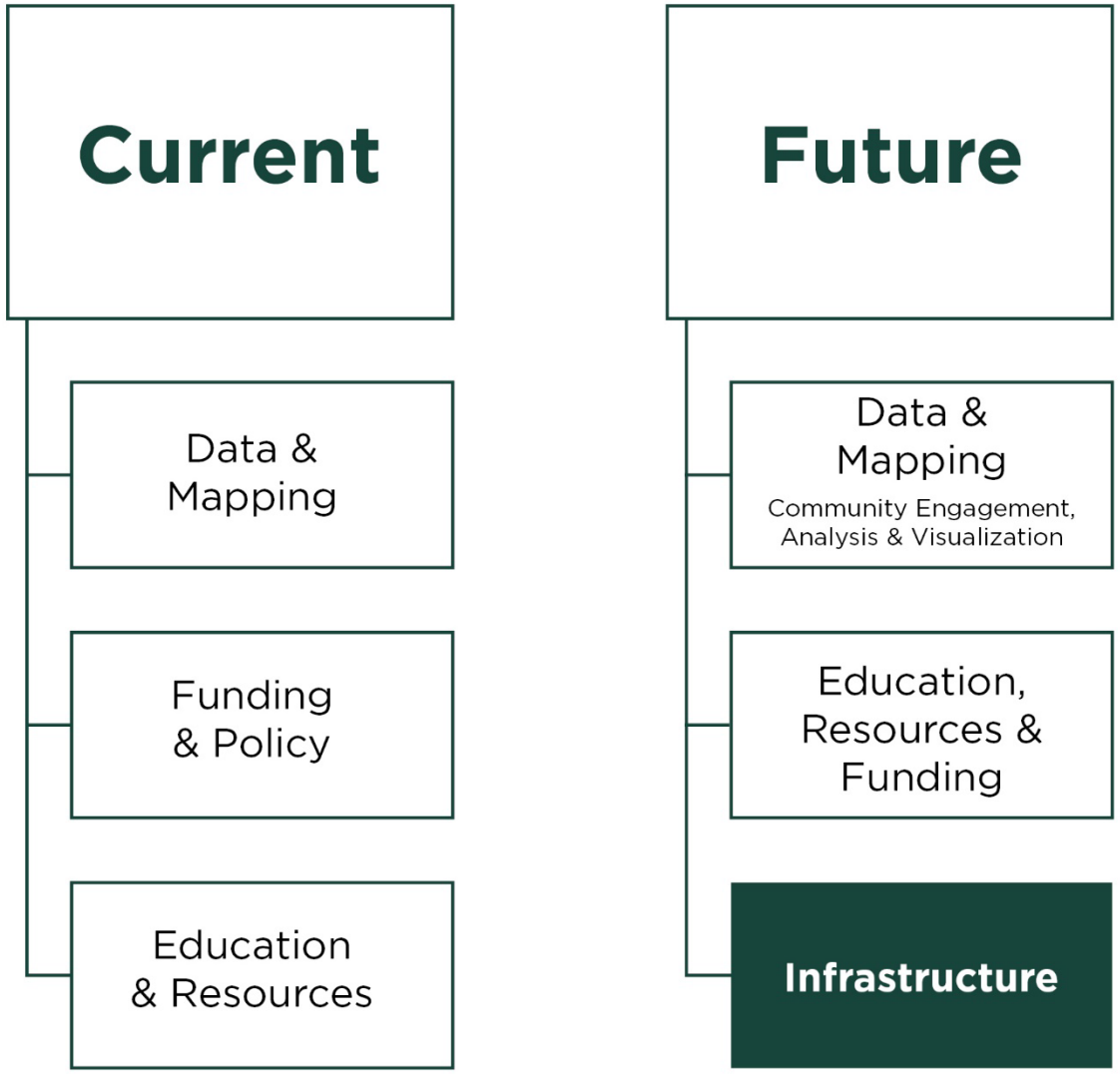
Johannes M. Bauer, Professor and Director, Quello Center

Pierrette Renée Dagg

Director of Technology Impact Research

Michigan Moonshot Pillars

Evolution



Michigan Open Optical Network:

MOON-Light

merit

MOON-Light Initiative

- Partially funded by the NTIA with $10.5M grant to MSU & Merit
- Improves broadband access for underserved communities and supports research simultaneously
- Foundation for the state plan - a unique "digital autobahn", open access middle mile network, one of the first in the U.S. at this scale
- Optical equipment upgrades at 103 colocation access facilities across Michigan – "Merit Open Access Exchange Connector" sites
- Will serve ISP and community networks by providing transport to Internet Exchanges in big cities – higher capacity/ lower cost backhaul
- Public-Private Partnership model
- Expands access to middle mile networks, lowering ISP project costs and accelerating their progress
- Increases competition in rural areas
- Already have letters of support from commercial ISPs

Importance for Michigan

- MOON-Light will improve the business cases for private, non-profit, and public, first/last mile Internet Service Providers (ISPs)
- It will provide better, higher-quality connectivity for anchor institutions (e.g., schools, libraries)
- This will allow supporting new applications and services (e.g., extended reality (XR) in education, healthcare) and boost innovation
- Access to high-speed connectivity is associated with job growth, higher income, start-up activity, higher property values
- It is also associated with better educational outcomes, stronger civic participation, and broad community benefits

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