COOPERATIVE EXTENSION

Proposal for 2023 Farm Bill
Community-Driven Data Science Extension Act:
An Expanded Role for Cooperative Extension

August 28, 2023

CHALLENGE

Every community has unique public policy challenges but limited assets to overcome them. Advances in data science, computational power, and access to transactional data have resulted in innovations in local governance. However, under-resourced places are playing catch up in this technological advancement because they need access to the skillsets and cutting-edge data science programs and technicians. Fortunately, America's network of land grant universities and Cooperative Extension can help them catch up and access modern data science tools.
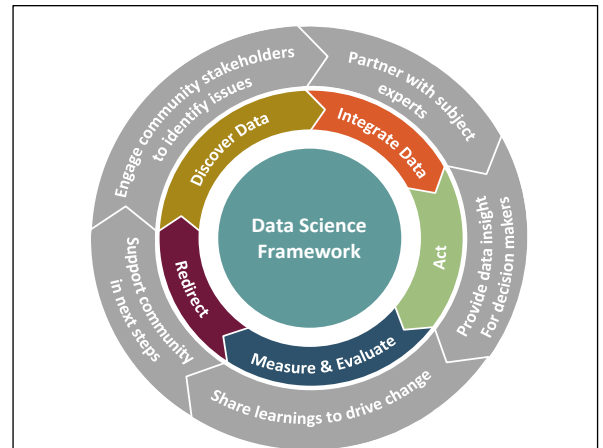
SOLUTION

Through the USDA's Cooperative Extension Service, America's network of land grant universities is stepping in to provide access to modern data science tools and insights in under-resourced places. This is being done through a tested model called **Community Learning through Data Driven Discovery (CLD3)**. Using the CLD3 model, Cooperative Extension professionals and university-based data scientists partner with local civic and political leaders to define problems, identify needed assets, put existing resources to better use, or expand the capacity and capabilities of existing public policy programs. Through several successful pilots, the CLD3 model has proven to help communities better manage their futures. Vitally, the proposed authority in the research and extension title in the 2023 Farm Bill will bring the CLD3 model to many more under-resourced communities across the country.

The *Community Learning through Data Driven Discovery* model. The <u>outside wheel</u> represents continuous interaction with community leaders throughout the process. The <u>middle wheel</u> is the data-driven learning process, where data science capacity is grown among communities and CES professionals. The <u>frontier</u> between the outer and middle wheels connotes active collaboration between all stakeholders. The <u>inner circle</u> codifies the rigorous research base to guide the data science applications.

REQUEST (proposed statutory language in blue starts on the next page)

Universities across the United States are partnering with the Cooperative Extension System to add authorization language in the 2023 Farm Bill to establish new competitive funding authority to develop and sustain a national partnerships network that integrates data science and Cooperative Extension expertise. The new authority within the existing Agriculture and Food Research Initiative will support a curated CLD3 National Data Commons to support evidence-based program and policy development and to establish CLD3 communities of practice.

MATERIALS BELOW

   Justification and APLU Support
   University contacts
   Marker Bill language
   Examples across Virginia, Iowa, Colorado, and Oregon

JUSTIFICATION

The CLD3 model is built on a foundation of data science research and is supplemented by research traditions embedded in land-grant extension. The critical innovation is data-informed community-based research. The community participates in asking and answering the questions to drive data gathering and create data insights relevant to program or policy decisions. CLD3 has been successfully implemented across multiple states, including Virginia, Iowa, and Oregon, and provides the path for how other states could launch and develop similar programs that would spread data science to support economic advancement, workforce development, rural prosperity, open data architecture, data cooperatives, precision agriculture, and broadband access.

Association For Public And Land Grant Universities (APLU) SUPPORT

CLD3 efforts are highlighted in the APLU's 2023 Farm Bill recommendations for Smith Lever 3(d), as indicated in bold: "*APLU BAA is supportive of the continued growth of these programs and others which may arise to address the nation's grand challenges including . . . **building community-based science and decision-making systems***, *among other areas.*"

UNIVERSITY CONTACTS

- **Cathie Woteki**, Iowa State University. University of Virginia, Distinguished Biocomplexity Institute Professor. USDA Chief Scientist and Under Secretary for Research, Education, and Economics, 2010-2017: cwoteki@iastate.edu
- **Rich Bonanno**, North Carolina State University. Director North Carolina Cooperative Extension; Associate Dean, College of Agriculture and Life Sciences: abonann@ncsu.edu
- **Cassandra Dorius**, Iowa State University. Associate Professor and Director of Iowa's CLD3 Initiative: cdorius@iastate.edu
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- **Brian Kowalkowski**, College of Menominee Nation. Director of Extension; Dean of Continuing Education: bkowalkowski@menominee.edu
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- **Mike Lambur,** Virginia Cooperative Extension Emeritus, lamburmt@vt.edu
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APPENDIX: MARKER BILL LANGUAGE
H.R. _____

SECTION 1. SHORT TITLE.
This Act may be cited as the ''**Community-Driven Data Science Extension Act".**

SECTION 2. COMMUNITY-DRIVEN DATA SCIENCE EXTENSION AND ENGAGEMENT COMPETITIVE FUNDING PROGRAM.

Section 3 [7 U.S.C. 343], Subsection (d) of the Smith-Lever Act of 1914 is amended to insert "the Community-Driven Data Science Extension and Engagement funding program" immediately before "the Children, Youth, and Families at Risk funding program and the Federally Recognized Tribes Extension Program."

[Section 3(a) 7 U.S.C. 343 remains unchanged:

(a) there are hereby authorized to be appropriated for the purposes of this Act such sums as Congress may from time to time determine to be necessary.]

SECTION 3. COMPETITIVE GRANTS FOR COMMUNITY-DRIVEN DATA SCIENCE RESEARCH AND EXTENSION WITHIN THE CURRENT AGRICULTURE AND FOOD RESEARCH INITIATIVE.

Section 2 subsection (b) AGRICULTURE AND FOOD RESEARCH INITIATIVE paragraph (2) PRIORITY AREAS of the COMPETITIVE, SPECIAL AND FACILITIES RESEARCH GRANT ACT (7 U.S.C. 3157), is amended to add Subparagraph G:

"(G) DATA SCIENCE RESEARCH AND EXTENSION TO SUPPORT COMMUNITY-DRIVEN DATA SCIENCE AND DECISION-MAKING SYSTEMS, including –

(i)Creation of a National Data Commons;

(ii) Creation of a Data Science Community of Practice; and

(iii) Building community-driven data science and decision-making systems."

Section 2 subsection (b) AGRICULTURE AND FOOD RESEARCH INITIATIVE paragraph (11) AUTHORIZATION OF APPROPRIATIONS of the COMPETITIVE, SPECIAL AND FACILITIES RESEARCH GRANT ACT (7 U.S.C. 3157), is amended to replace "fiscal years 2008 through 2023" with "fiscal year 2024 through fiscal year 2028".

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BRIEF EXPLANATION

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H.R. ___, the Community-Driven Data Science Extension Act builds on the existing extension expertise within all land-grant institutions and current infrastructure at USDA. It amends two existing authorizations for competitive grant programs using current, existing authorizations for appropriations.

This legislation amends the Smith Lever Act of 1914 [7 U.S.C. 343] and Section 2 subsection (b) AGRICULTURE AND FOOD RESEARCH INITIATIVE of the Competitive, Special and Facilities Research Grant Act of 1965 [7 U.S.C. 3157] to provide authority for competitive grants to support vital community-driven data science programs to serve communities and their public policy objectives. This enhanced authority builds upon current law in Title VIII of The Agriculture Improvement Act of 2018 ("2018 Farm bill"). All 1862, 1890, and 1994 land-grant institutions are eligible to compete for the **COMMUNITY-DRIVEN DATA SCIENCE EXTENSION AND ENGAGEMENT COMPETITIVE FUNDING PROGRAM.** All 1862, 1890, and 1994 land-grant institutions as well as Hispanic-serving institutions and other research universities are eligible to compete under the new priority area (G) DATA SCIENCE RESEARCH AND EXTENSION TO SUPPORT COMMUNITY-DRIVEN DATA SCIENCE AND DECISION-MAKING SYSTEMS within the Agriculture and Food Research Initiative competitive grants program.

H.R. ___ recognizes the powerful Community Learning through Data Driven Discovery model ("CLD3"), in which local government leaders drive priorities and partner with state and local extension professionals. The CLD3 model has proven capacity for accurate evaluation of local programs, enhanced programming for economic and workforce development, and better community-based grant writing.

H.R. ___ seeks to ensure that America's small, rural and tribal communities have access to data science research and support systems for data-driven decisions. New priorities for competitive funds will encourage 1862, 1890, and 1994 land-grant universities to work collaboratively with public and private universities and nonprofit organizations to develop, deploy, and curate data science processes and establish communities of practice. It is critical that all of America's communities have access to data science research and support from extension professionals regarding community decisions, a priority identified by the Association of Public Land-Grant Universities (APLU).

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PURPOSE AND NEED FOR LEGISLATION

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Section 2. New authority for a competitive grant program for the **COMMUNITY-DRIVEN DATA SCIENCE EXTENSION AND ENGAGEMENT FUNDING PROGRAM** is added to the Smith Lever Act. All 1862, 1890 and 1994 land-grant universities are eligible to compete.

Originally enacted in 1914, the Smith Lever Act expanded USDA's partnership with land-grant universities to apply research and to provide education in agriculture. Over the last century, extension has adapted to changing times

and landscapes, and it continues to address a wide range of human, plant, and animal needs in both urban and rural areas. The use of community-driven data science supports the nation's transformation from a manufacturing society to an information society.

Every community has unique public policy challenges but limited assets to overcome them. Using these limited assets optimally is critical to the success of communities and their citizens, and that's becoming easier due to greater access to data and computational power, as well as advances in data science. Unfortunately, communities, especially smaller counties, towns, and rural places with fewer resources and data experts are missing out on the data-empowered governance movement.

America's network of land grant universities, through the USDA's Cooperative Extension Service programs, are stepping in to provide access to modern data science tools and insights in under resourced places. This is being done through a tested program called Community Learning through Data Driven Discovery (CLD3). Through CLD3, university-based data scientists partner with local civic and political leaders to define problems, identify needed assets, put existing resources to better use, or expand the capacity and capabilities of existing public policy programs. Through several successful pilots, CLD3 has proven to help communities better manage their futures. Vitally, the proposed authority for the research and extension title in the 2023 Farm Bill will bring CLD3 to many more under resourced communities across the country. CLD3 was piloted in Virginia, Iowa and Oregon, supported by federal and nonfederal competitive grant funds. CLD3 is a model for how all states, territories and institutions could launch and develop similar programs to deploy data science expertise to support community-driven decision making.

Section 3 creates a new competitive grant priority for **COMMUNITY-DRIVEN DATA SCIENCE RESEARCH AND EXTENSION** within the current Agriculture and Food Research Initiative.

The current authorization for appropriations of $700,000,000 annually, which expires September 30, 2023, is extended through fiscal year 2028.

Within the new PRIORITY AREA (G) DATA SCIENCE RESEARCH AND EXTENSION TO SUPPORT COMMUNITY-DRIVEN DATA SCIENCE AND DECISION-MAKING SYSTEMS, competitive grants are authorized to:

1) Support and strengthen the existing National Data Commons with a goal to enhance current situational analyses and programming reports through geospatial mapping and analysis of local administrative data, federal and state data, and social media. Participants in the National Data Commons develop and curate processes to support data discovery, sharing, access, analytics, and evaluation for data-driven decision making across the Cooperative Extension System ecosystem; and

2) Create a national Data Science Community of Practice to support community-based research and extension that will include the data infrastructure and community engagement innovation necessary to convert the Community Learning through Data-Driven Discovery (CLD3) pilot project to a national scale. The Data Science Community of Practice will link the Cooperative Extension System with local government officials and other constituents through the CLD3 model and facilitate collaboration with data science researchers at universities.

3) Fund community-driven data science to address important and emerging issues using dynamic, science-based information resources to benefit community decision-making and promote rural vitality. Critical topics include open data architecture, data cooperatives, precision agriculture, economic development, broadband access, and workforce development, among others.

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END MARKER BILL TEXT

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CLD3 Highlights in Virginia Cooperative Extension (VCE)
Leveraging data science to address Virginia's most pressing issues

Enterprising projects
VCE agents initiated and led 15 ambitious projects in the last three years. Check out two examples:

Addressing Barriers to Health Care Access and Use in Patrick County, Virginia
https://dspgtools.shinyapps.io/patrickdash/

Service Provision for Vulnerable Transition Aged Youth in Loudoun County, Virginia
https://dspgtools.shinyapps.io/dspg21loudoun/

Process adds value
"It can seem like we're just looking at data but the end product impacts lives in a really positive way. It's going to have a positive impact in real people's lives."

Data informed actions
Health care access in Patrick County was severely limited after the closure of the only hospital in 2017. In 2020, CLD3 identified local EMS stations as potential telehealth sites based on data indicating that 76% of the population is within a 12-minute drive of a station. Working with onsite health care professionals, telehealth visits with a doctor or specialist are now available at the nearest EMS station. Funding has been secured to support this innovative strategy.
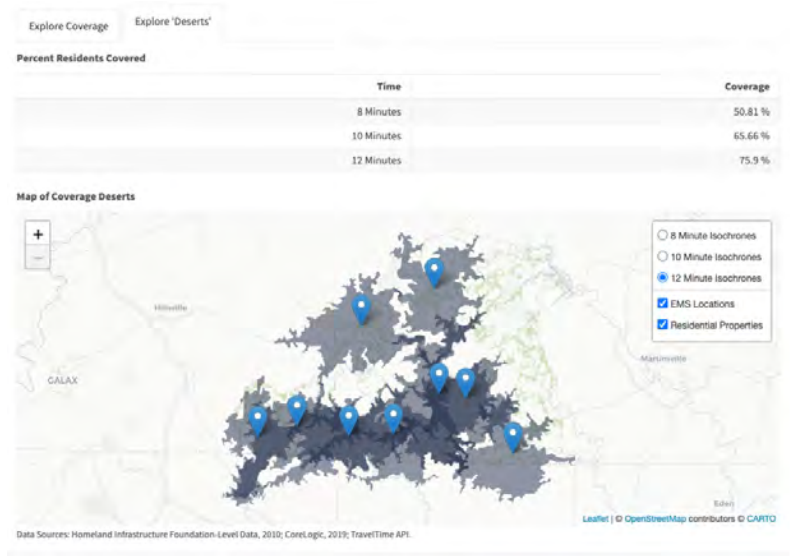
Positive spinoffs
As a direct result of the Patrick County project, two dynamic dashboards have been created:

Access Barriers to Health in Rural Virginia (https://dspgtools.shinyapps.io/ruralvirginia/), funded by the Extension Foundation in collaboration with the Virginia Department of Health (VDH).

VDH Data Commons (https://uva-bi-sdad.github.io/vdh_rural_health_site/).

Future funding critical for continued success
Future funding would provide the ideal opportunity to underwrite appropriate faculty specialist positions, conduct more projects, provide professional development opportunities for field and campus-based faculty, and create new valuable data science resources and tools.

To learn more about CLD3 in VCE contact
Michael Lambur: lamburmt@vt.edu

Virginia Cooperative Extension
Virginia Tech. • Virginia State University

Community Learning through Data Driven Discovery (CLD3) Highlights at Iowa State University

THE RIGHT STOP

Marshalltown, Iowa

What can be done about declining bus ridership in a community of 27,000 residents?

About CLD3

Our team of Cooperative Extension faculty and staff, University researchers, and student interns help partner with communities of interest and place to leverage data science in addressing Iowa's most pressing problems.

Transportation in Marshalltown, Iowa

Local transportation systems are crucial to mobility, commerce, economic development, public safety, and community vitality.

Marshalltown, Iowa, was experiencing declining bus ridership and increasing public dissatisfaction with local transportation options. The CLD3 team met with local leaders to clarify the community's central needs and identify data sources that could promote novel insights.

Community-Driven Research

Using cutting-edge mapping techniques, ISU's team identified neighborhoods where new bus stops could improve transportation access, especially among underserved elderly, lower-income, and minority populations.

Data-Informed Actions

Marshalltown's city transit authority acted on these data insights, adding new stops to better meet the needs of residents, with a focus on improving access for vulnerable groups.

A Win for Iowa Residents

The resulting 11% increase in yearly ridership led to Marshalltown being awarded both the Federal and State Transit Authority Awards of Excellence for the highest percentage increase in ridership among rural providers. The CLD3 project also generated new opportunities to leverage data to improve local decision making with follow-up funding by the League of Cities and AARP to support other nontransportation-related issues.

Questions?

To learn more about how the CLD3 process has been used to support Iowans, contact Cassandra Dorius (cdorius@iastate.edu) or Christopher Seeger (cjseeger@iastate.edu).

SCAN ME

IOWA STATE UNIVERSITY
Extension and Outreach

STORIES OF COMMUNITIES

FROM OREGON TO COLORADO

1

2

3

STORIES OF COMMUNITIES

Cooperative Extension professionals live, learn, work, and play in neighborhoods and communities of all sizes. In Oregon and Colorado, Extension professionals are positioned to listen and gather insights to what contributes to a thriving community. With individuals and families at the center of all our work, insights through data foster inclusive and responsive program development.

TRAINING FOR PROFESSIONALS

A new training program prepares Extension professionals and community leaders to create and curate equitable processes to support data discovery, sharing, access, analytics, and evaluation for data-driven decision making that leads to evidence-based governance and programs. The initial training modules can be found at https://workspace.oregonstate.edu/cc

ACCESS & USE OF DATA INSIGHTS

Data-driven research provides a rich, mutually rewarding opportunity to leverage community knowledge and public information resources to affect positive social change. In Oregon and Colorado, community members, faculty, graduate students, Extension professionals and interns collaborate to solve problems and gain insights from data of interest to residents.

### Water Quality Requirements for Fresh Produce Growers

Most farms have little control over the quality of the water that they use, including levels of chemical and microbial contamination, and strategies used by treatment plants to mitigate poor water quality. The U.S. Food and Drug Administration's (FDA) Produce Safety Rule provides mitigation options including the simplest approach of applying an extended interval for irrigation-to-harvest. However, for much of Oregon's produce, this is not a viable option since rainfall is rare during the summer months and crops need regular watering for produce to remain attractive to consumers. Oregon's specialty crop industries need support to ensure their compliance with the FDA's produce rule by access to real-time information about water quality at various stages during production. Oregon State Extension professionals and university researchers evaluated historical water quality data from the Tualatin River and the Treasure Valley area to put the current water quality criteria regarding microbial contamination into context with the rule requirements for clean produce.

Using their findings, they worked with farmers in these regions to ensure adherence to the produce rule, which will help them stay profitable by minimizing water costs and losses due to fines or rejected shipments of produce.

Impacts of Dam Water Release Policy on Deschutes River Health and the city of Maupin

Much of the economic engine of Maupin, Oregon and the surrounding community is based on Deschutes River tourism, drawing domestic and international visitors. In recent years, water flow and use of the river have been altered because of changes in operation of the Pelton-Round Butte dam and hydro system, which has led to changes in the river's flow, temperature, and chemistry. Concurrent with these changes is a perceived decline in the natural productivity of the river, a decline in catch rates for fishers, and a decline in tourism dollars flowing to the region. To help advise water and natural resource management of this river system, Oregon State University Extension professionals and university researchers created data science insights that incorporate data from Portland General Electric, the Deschutes River Alliance, and the Oregon Department of Fish and Wildlife, to identify whether trends in fish abundance are the result of local effects native to the Deschutes River system itself or are more regional in nature, occurring across the broader Columbia River landscape.
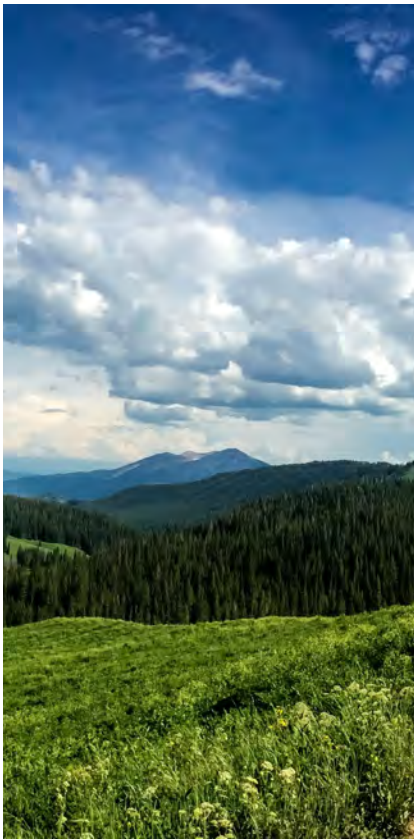
Citizen Science: Designing & Implementing Projects for Greater Impact

Public participation in scientific research (citizen science or CitSci) engages diverse people and stakeholders in science through collaborative and transformative initiatives. The NREL offers a wide array of support services for citizen science endeavors – from its renowned global citizen science support platform CitSci.org to hands-on engagement of our staff in projects spanning bioblitz events at National Parks to large-scale crowdsourcing of algae bloom monitoring in high alpine lakes to development of customized portals and mobile applications for citizen science. The Lab also studies the effectiveness of citizen science endeavors and factors affecting the collective impacts and outcomes of citizen science for science, society, and socio-ecological systems. With the support of the Natural Resource Ecology Lab (NREL) at Colorado State University, CitSci now hosts 1129 projects that have contributed more than 1584136 data points to answer local, regional, and global scientific questions.

The Colorado Food Systems Coalition: Making Global Impact through Local Connections

A project of the Colorado State University Food Systems Initiative and LiveWell Colorado, the Colorado Food Systems map aggregates relevant food systems indicators and makes them available to all stakeholders. The map is useful to communities throughout the state as food system initiatives are planned, implemented and evaluated for the social, environmental, and economic effects.

Colorado Insights: Integrating Data & Tools to Support Decision-Making Across Colorado

The purpose of the Colorado Mapping Project is to provide an accessible, publicly-facing platform where critical data layers related to Colorado food and agriculture, health and wellness, youth, sustainability, and the economy. Individuals, families, and communities gain insights from data through the search feature and capacity of the platform. Neutral, timely, accurate data can substantiate grant requests, support informed policy and reporting, and provide a holistic perspective into Colorado, including its assets and issues, through multiple lenses. The map showcases and celebrates Colorado's community successes, supports the building of networks, and provides examples and inspiration to neighboring communities as well as communities across the state.

> **By meeting our communities where they learn, Cooperative Extension will continue to take a lead role in bringing restorative and transformative impact to audiences of all ages and stages in life.**

TRAINING EXTENSION PROFESSIONALS & COMMUNITY LEADERS–
DATA SCIENCE & CULTURAL COMPETENCIES

To respond to the increased needs for equitable and inclusive programming for a diverse population, Extension professionals and community leaders need to create and curate processes to support data discovery, sharing, access, analytics, and evaluation for data-driven decision making that leads to evidence-based governance and programs with communities of all sizes.

Data Science Competencies

1. Representing ideas through data insights

2. Data-informed problem solving

3. Reasoning & assessing conclusions based on data-driven learning

4. Selecting tools & strategies

5. Reflective thinking over data science-oriented problem solutions

6. Connecting & Communicating

Cultural Competencies*

1. Appreciating the complexity of identity

2. Redressing past & present inequities

3. Embracing collaboration across difference

4. Engaging the here & now

5. Attending to environmental factors

6. Practicing cultural humility

7. Maintaining global consciousness

8. Using inclusive & affirming language

9. Recognizing processes & outcomes of socialization

*The nine cultural competencies were developed by the OSU Office of Institutional Diversity and are based on the American Psychological Association *Multicultural Guidelines: An Ecological Approach to Context, Identity, and Intersectionality,* 2017