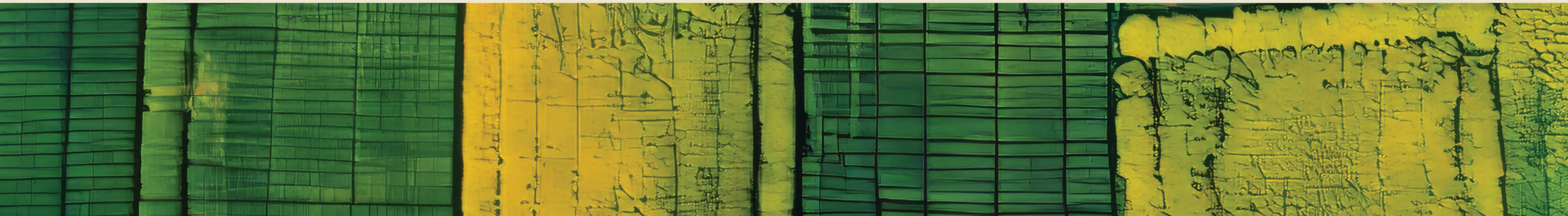
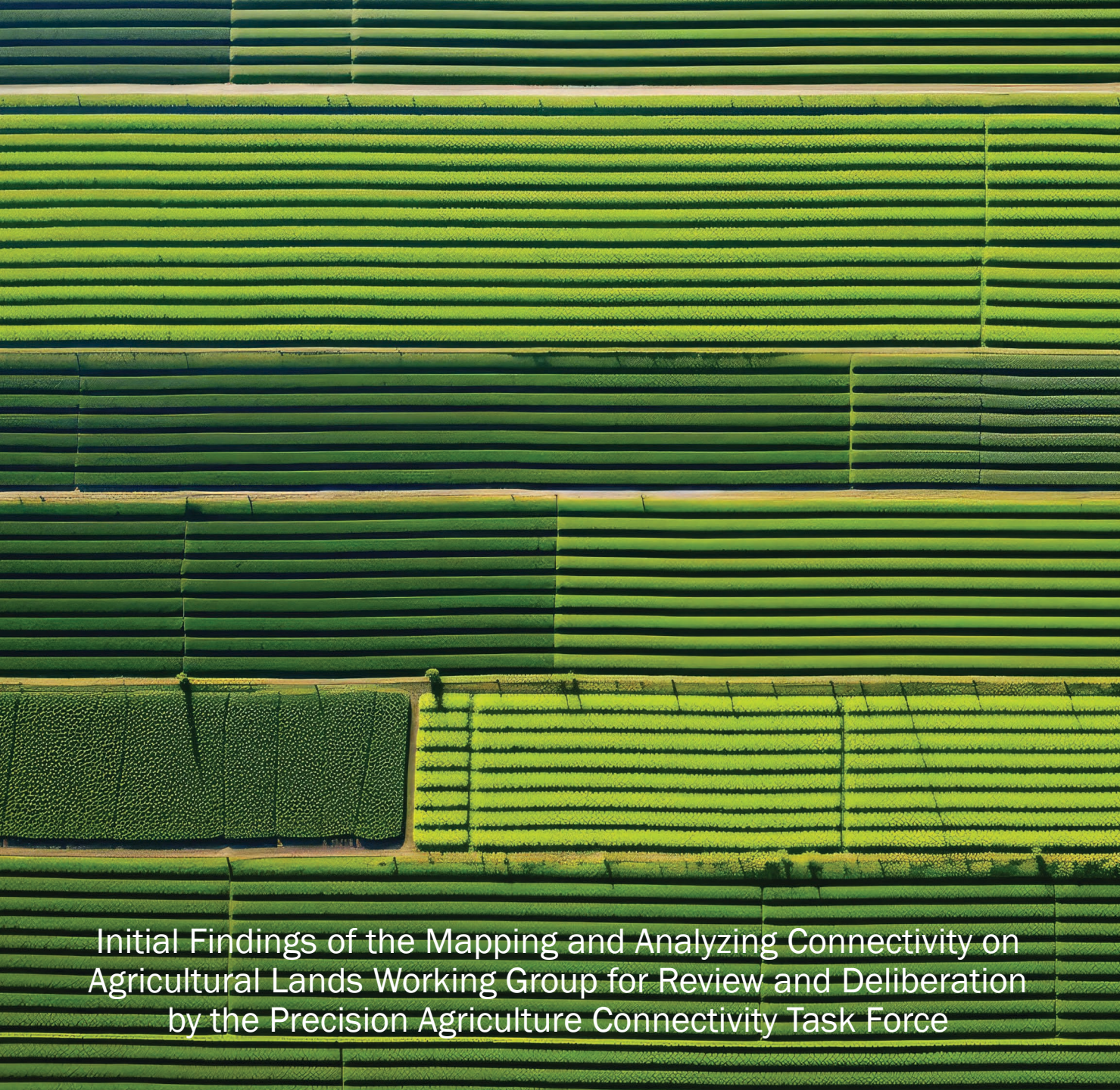




TASK FORCE FOR REVIEWING THE
CONNECTIVITY AND TECHNOLOGY
NEEDS OF **PRECISION AGRICULTURE**
IN THE **UNITED STATES**





Initial Findings of the Mapping and Analyzing Connectivity on
Agricultural Lands Working Group for Review and Deliberation
by the Precision Agriculture Connectivity Task Force

1

MAPPING AND ANALYZING CONNECTIVITY ON AGRICULTURAL LANDS

Recommendation Categories

1. Presentation of the Map
2. Validation and Verification of the Map's Accuracy
3. The Public Challenge Process
4. Sustainability of the Map
5. Awareness of the National Broadband Map and Outreach

Presentation of the Map

The working group recommends:

- The mobile map reflect performance consumers may typically expect, considering both RF coverage and typical network load.
- The mobile map include a clear legend explaining, in terms an ordinary citizen can understand, how the map is to be interpreted.
- By default, the satellite view be enabled when the mobile map is being viewed.
- Mobile Satellite Services be added to the National Broadband Map.
- USDA NASS produce a map layer that includes mobile coverage over agricultural land.
- The FCC produce a map (separate from the National Broadband Map) indicating where devices operating under TVWS rules can be used.

Validation & Verification of the Map Data

The working group recommends:

- FCC establish an independent, on-the-ground sampling approach to verify Mobile Map accuracy that is sustainable over the long term.
- FCC should use propagation models that are open-source and widely peer reviewed.
- FCC and USDA encourage and advocate for further research directed towards mobile mapping efforts over agricultural lands for improved accuracy.

The Challenge Process

The working group recommends:

- FCC develop a mobile challenge process that is suitable for sparsely populated agricultural and tribal lands.
- When a challenge is submitted, the FCC inform the challenger of additional testing required in order for the challenge to be recognized and acted upon.
- The FCC ensure that network operators do not inappropriately prioritize speed test traffic over ordinary network traffic.
- FCC collaborate with all mobile phone manufacturers to make low-level data such as RSRP, frequency and Cell ID available on the official speedtest app.
- For transparency, the location of pending and resolved mobile challenges in download data files should include latitude and longitude; currently these locations are identified only by H3 hex cell ID.

Sustainability

Congress and FCC must ensure adequate funding to sustain the mapping process on an ongoing basis, including:

- Independent, on-the-ground testing to verify network performance.
- Maintain the FCC speedtest app.
- Adequate funding for NASS to perform finer granularity census and surveys.
- Fund further Federal research to make the map more accurate and less labor intensive to maintain, especially over agricultural and tribal lands.

Awareness and Outreach

- FCC must promote more widely the National Broadband Map and the challenge process, especially among agricultural communities.
- USDA and its Land Grant partners must educate agricultural, rural and tribal communities in awareness of the National Broadband Map and its application.
- USDA and its Land Grant partners support these same communities to actively participate in the verification and challenge process.



2

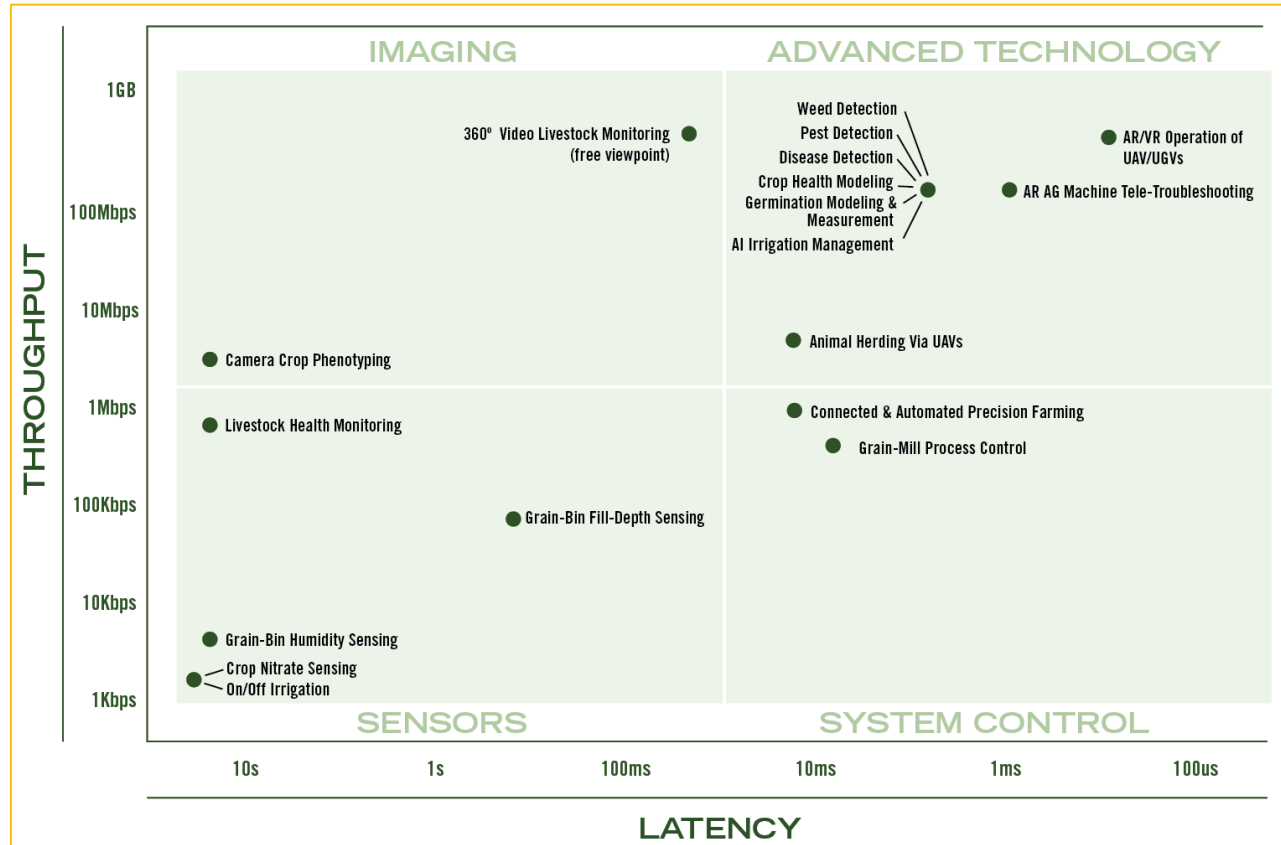
EXAMINING CURRENT AND FUTURE CONNECTIVITY DEMAND

Initial Findings of the Examining Current and Future
Connectivity Demand Working Group for Review and
Deliberation by the Precision Agriculture Connectivity Task
Force

Key Learnings:

1. Last term we cited the accelerating growth in technology. The accompanying volume of data being produced is also growing at an equally amazing pace.
2. “Data is the new tractor.” Jeff Rowe, Syngenta CEO, speaking at WSJ 2024 Global Food Forum.
3. The solutions to advancing technology and surging data generation are higher speeds (especially throughput) and more spectrum.
4. “Broadband inequality is a dollar issue not a technology issue.” - Ali Khayrallah, Ericsson.
5. Newly developed mapping tools of under and unserved rural locations suggest that fiber-to-the-farm *can* be achieved - *not* fiber to the field, but to enable Edge compute for data intensive processes.
 - 96.1% of all crops are within 10 miles of fiber.
 - 99.9% are within 25 miles
6. Farm to fork traceability *requires* last acre coverage essential for food security.
7. The “killer app” is a group of autonomous machines working together connected to cloud/edge compute ~ James Krogmeier, IoT4Ag
8. There is no “silver bullet”, single broadband provisioning solution to address current and future precision ag needs.

Bandwidth



While it appears the farm could operate on lower bandwidth within a bubble, this is an incomplete picture. Transmitting and analyzing collected data require higher throughput to be actionable in real time. Evolving technology and operations in the future will demand even more bandwidth.

Current Needs:

The working group recommends the following:

- "Last Acre" broadband connectivity.
- Achieve bandwidth standards of 100/100 and .5 ms latency.
- Target BEAD funding for Precision Agriculture, as final allocations are made, to extend fiber deployment to farm and ranch premises.
- Relaunch the \$9 billion 5 G Fund for Rural America to enable on farm crop monitoring systems i.e., IoT, autonomous tractors, variable rate irrigation.
- Allocate mid band spectrum for agricultural use to boost bandwidth.
- Open up un- and underutilized, unlicensed, lower band spectrum in the 400 MHz range for on-farm IoT connectivity.
- Invest in deployment and operations of private cellular networks where high performing public networks (CSPs) are not available to the Last Acre.
- Improve platform and device density capacity to deploy thousands of sensors across large farms/ ranches.
- Incentivize increase on farm data capacity/processing through highly secured Cloud Connectivity/Edge Compute to streamline the massive amount of data being generated, mitigating bandwidth limitations, and opening up new possibilities.
- Agriculture needs a seat at the table in creating standards that ensure interoperability, redundancy and security.

Future Needs:

The working group recommends the following:

- Analyze unserved/underserved areas post BEAD.
- Incentivize targeted build out of high-performance wireless connectivity – both terrestrial and satellite - to fill post-BEAD gaps.
- Ensure agriculture is one of the key verticals in development/deployment of 6G.
- Achieve bandwidth standards of 1GB/1GB and <.5ms latency for emerging use cases such as machine learning and training on high resolution imagery, which can create up to 1TB of data per day.
- Secure funding for post deployment, actual operations and maintenance.



Initial Findings of the Accelerating Broadband Deployment on
Unserved Agricultural Lands Working Group for Review and
Deliberation by the Precision Agriculture Connectivity Task
Force

3

ACCELERATING BROADBAND DEPLOYMENT ON UNSERVED AGRICULTURAL LANDS

- **Use of Geographic-Based Build-Out Requirements**

Going forward, the FCC should consider geographic- (rather than population-) based build-out requirements that incorporate strong incentives to serve rural agricultural areas

- **Incentives for Further Build-Out After Initial License Term**

The FCC should incentivize further network deployment by wireless licensees, in a manner consistent with the universal service objectives

- **Overlay Use of Unused/Underused Portions of License Area**

Carriers that have met their build-out requirements but have not served rural/agricultural portions of their license areas by the end of the build-out period should be subject to overlay use in those areas.

- **Partitioning Unused/Underused Portions of License Area**

Licensees that cede primary rural spectrum for deployment on farmlands, essentially partitioning at no charge, could be given some amount of bidding credit for use in future auctions

- **Promote Wireless Infrastructure Deployment**

The FCC should urge the States and NTIA to encourage the submission of project ideas that include the provision of wide area connectivity

- **Update Colo Void Policy**

The FCC should work with the FAA to update its “Colo Void Policy” to add critical low- and mid-band spectrum.

- **Financial Incentives for Further Buildout**

Granting agencies and Congress should explore offering bidding credits, tax credits, and other incentives

- **Targeted Subsidy Program for Precision Agriculture**

Targeted subsidy programs, such as a portion of 5G Fund, may be necessary for sparsely populated areas where it is difficult for a commercial wireline, wireless, or satellite provider to serve

- **New “5G Fund” Should Consider New and Planned Deployments**

The FCC should avoid rushing the creation of its “5G Fund” until it has a clear deployment picture, incorporating the fiber and wireless projects funded by the BEAD program

- **Facilitate (Allow) Funding from Multiple Sources to Build Service to Unserved and Underserved Areas on a Project Basis***

Rural areas are high cost buildouts with low returns which inherently require greater resources to deliver service to unserved and underserved areas. Granting agencies should adapt eligibility requirements to allow for multiple funding sources for high cost areas

- **Equip Local Permitting Authorities**

Resources should be made available to these authorities to aid in permitting and siting

- **Update NEPA/NHPA Implementation**

The FCC should update its rules and policies for implementing NEPA and NHPA, including the list of recognized “categorical 5 exclusions” from environmental and/or historic preservation review, for deployments likely to benefit unserved agricultural lands.

- **Cost-Based Permitting/Fee**

The FCC should clarify that its cost-based fee standard applies beyond small cells and encourage state and local governments to adopt siting fee structures that incentivize rather than impede deployment (particularly in unserved agricultural areas)

- **Ongoing Efforts to Ensure Quality of Maps**

The FCC should ensure that its maps of unserved and underserved locations, that are the foundation of funding decisions, are accurate.

- **Develop Playbook for Deployment**

The FCC and USDA should work with non-profit organizations, trade associations, and other private parties to develop “playbooks” to guide deployment of precision agriculture connectivity solutions for various applications and use cases.

- **Establish Process of FCC and NTIA to Set Spectrum Priorities**

To make progress on the other past spectrum recommendations from the PATF, there should be a process that allows the FCC and NTIA to provide guidance to PATF on setting spectrum policy priorities.

- **Encourage Use of Unlicensed and Licensed-by-Rule Spectrum**

Do not discourage the use of networks that rely on unlicensed spectrum or licensed-by-rule spectrum, including General Authorized Access spectrum in the Citizen Broadband Radio Service band (3.55 to 3.70 GHz); but also make a licensed option available

- **Adoption of “Rural” Service Rules**

When new spectrum becomes available for nongovernmental (e.g., mobile) use, the FCC should consider whether it would be appropriate to adopt different allocations/service rules for urban and rural use.

- **Catalog Underutilized Spectrum**

The FCC should look for existing spectrum under 6 GHz and especially under 2 GHz that is underutilized in rural areas, even if it is part of an existing geographic license that is mainly used in more densely populated areas.

- **Allocate Low Band Spectrum for Precision Agriculture**

The FCC should look at allocating a sub-1-GHz spectrum for modest-speed Internet-Of-Things use, such as a licensed version of LoRa with modestly higher power levels and coordinated, but not necessarily exclusive, channel allocations.

- **Develop Test Beds for Private Networks**

FCC and USDA should develop additional private network experimental areas to determine the efficacy across a range of topographies and farm demographics.

- **Accelerate Development of Direct to Device (D2D)**

The FCC should take further steps to facilitate use of D2D satellite connectivity to augment terrestrial communications solutions while also managing interference and other risks so that they do not undermine deployment efforts.



4

ENCOURAGING ADOPTION AND AVAILABILITY OF HIGH QUALITY JOBS

Initial Findings of the Encouraging Adoption and Availability of
High Quality Jobs Working Group for Review and Deliberation
by the Precision Agriculture Connectivity Task Force

Alleviating labor force shortages and increasing demand for high-skill workers

- Ag tech will be a key tool in addressing human labor shortages and increasing demand for skilled workers
- University extension services in coordination with farmers and technology developers will play an important role in identifying tech solutions and their impact on workforce
 - Recognize ag tech as a key tool in addressing human labor shortages and increasing demand for skilled workers.
 - Support industrial and educational efforts to upskill farm workers with training in both specific equipment and common core technology.
 - Transition to workforce structures in which automation decreases the need for human labor while increasing the need for more highly skilled workers.

Federal, state and local coordination to promote adoption

- Expand ability of farmers to utilize USDA loan and other programs for ag tech deployment
- Create tiered incentive and other benefit programs that contemplate the size of farm, job development, productivity savings/gains, and other criteria for loans, matching funds, and other benefits
- Support research into ROI strategies for common and specialty ag tech applications

Promotion of post-secondary ag tech education

- Enable resources to be administered by extension services to develop ag tech curriculum
- Develop paid ag tech internship and apprenticeship programs that provide participants with renumeration as well as academic credits in both 2-year and 4-year programs
- Convene stakeholder conferences between farmers, extension services, and state employment offices to identify gaps and develop solutions

Government, industry, and stakeholder partnerships

- Farmers and coops can explore unlicensed spectrum where licensed or Federally supported services are not available.
- The ag industry is encouraged to explore partnerships and relationships with non-ag sectors who share common goals; land grant universities can offer a forum in which these relationships can be explored.

Obstacles farmers and ranchers face in adopting precision ag

- Collaborative efforts among younger and older farmers can spur adoption among older farmers.
- Cost of technology remains biggest barrier for small farmers.
- Affordability can be addressed by arrangements with service providers and coops.
- Scalability can ease costs.
- Developments of autonomous machines may reduce the size of farm equipment and create more appropriate scales for small farms.
- University extensions can support research to model ROI strategies.

Work that has been done in this area and lessons from other contexts

- Identify and proactively incentivize relationships between the leading adopters and states (or regions) where similar relationships are less robust.
- Create programs and/or incentives for Manufacturers to develop deeper product lines that can be applied to smaller farms and non-commodity crops.
- Elevate awareness and understanding of how PA is an essential and expanding tool for farmers and producers for sustainable and even more cost-effective operations.
- Identify and create incentives for relationships between the leading adopters and states (or regions) where similar relationships are less robust.
- Create programs and/or incentives for manufacturers to develop deeper product lines that can be applied to smaller farms and non-commodity crops.
- Elevate awareness and understanding of how PA is an essential and expanding tool for farmers and producers for sustainable and even more cost-effective operations.

Metrics for tracking progress

- Metrics for progress will contemplate several categories
- On the technology side, metrics may include market indicators such as sales, revenues and profits alongside review of new technology available in the marketplace
- On the adoption side, metrics may include surveys of farmers, dealers, and service providers to identify type and extent to which technology is adopted for plant and animal farming
- On the productivity side, progress can be measured by surveying savings in areas such as water, chemical, and labor costs, coupled with productivity and yield increases

Work done, and to be done (as of July 19)

- The Adoption and Jobs Work Group has hosted SMEs to present on the various charges
- Modules outlining the background of the charge and concluding with recommendations have been drafted and circulated within the Work Group for review and editing
- Two SME presentations remain, scheduled for July 26 and August 2
- The Work Group has identified significant cross-over among issue discussions leading to a general impression that the issues assigned to the Work Group can be represented properly in a complex Venn diagram