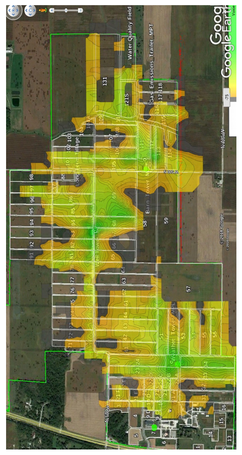
# *IoT for Ag* Testbed at ACRE

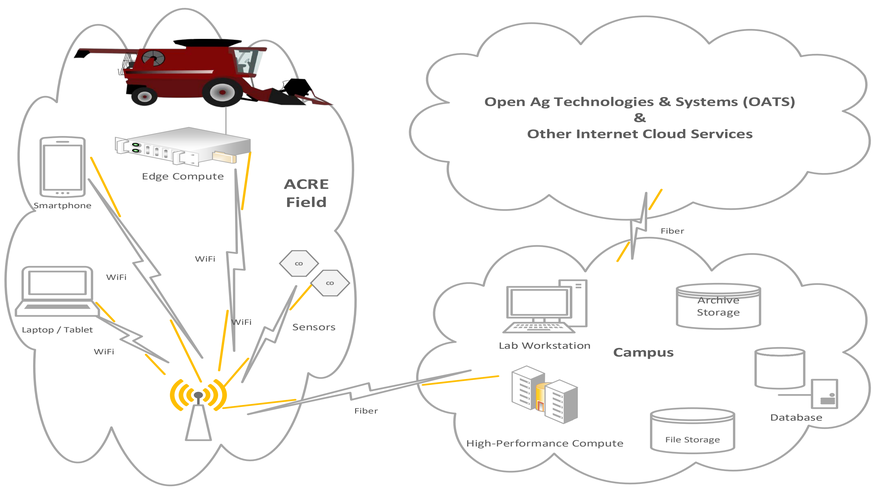
PURDUE AGRICULTURE

WHIN
WABASH HEARTLAND INNOVATION NETWORK

## Testbed Aspects

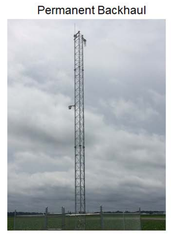
- Sensor testing
  - Accuracy
  - Reliability
  - Environmental tolerance
- Data flow
  - Data architecture
  - Automated workflow
- Connectivity – moving data
  - 3G, 4G, 5G
  - WIFI
  - LoRa
- Value analysis
  - Making sense of it all
  - Achieving good ROI







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= Adaptive

## Current Elements

**Water Quality Field Station (Dr. S. Brouder)**

- 54 plots with instrumented drains and lysimeters
- Assess management for environmental, agronomic, & economic effectiveness
- Study drainage design, cropping systems, manure application, nutrient utilization

**Micrometeorology (Dr. R. Grant)**

- Fluxes of greenhouse and other trace gases
- Heat, mass, and momentum fluxes
- Measurement and modeling of solar radiation distribution & crop effects

**Post-harvest Control/Monitoring (Dr. K. Ileleji)**

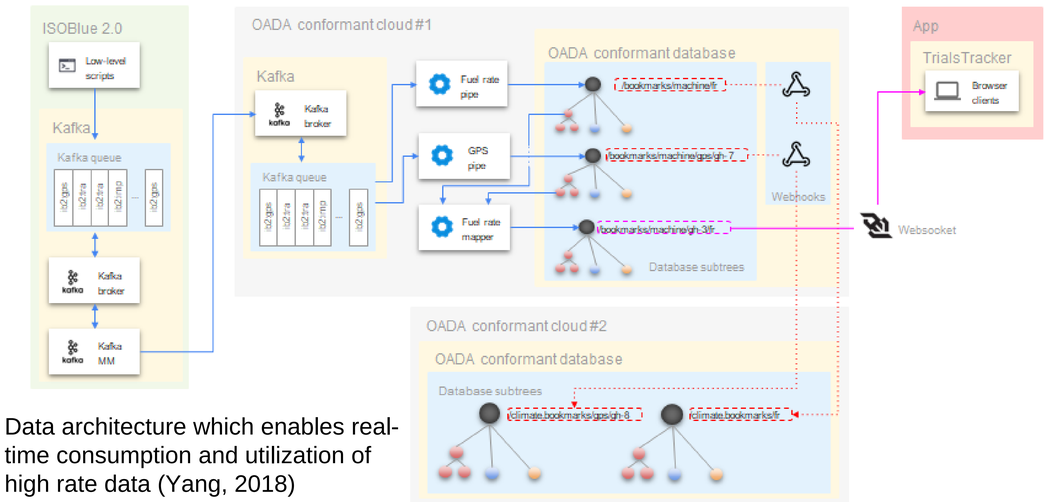
- Wireless monitoring of temperature & moisture
- Grain & bin air space
- Remote control and monitoring
- Drying & grain conditioning

**Remote Sensing (w/ UAV; Drs. R. Nielsen, S. Casteel, K. Cherkauer, D. Saraswat, & others)**

- RGB, thermal, hyperspectral imaging
- Phenotyping
- Stress detection (disease, nutrient, pest)

**Machine data (Drs. D. Buckmaster, J. Krogmeier)**

- Controller area network sniffing for fuel consumption, draft, tillage depth, slip, etc. with ISOBlue units
- Activity tracking
- Striving for autonomous data flow



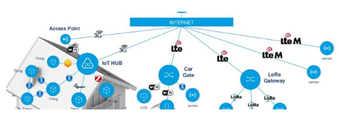

Data architecture which enables real-time consumption and utilization of high rate data (Yang, 2018)

## Near Term Plans

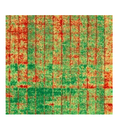
Streamline metadata collection

Additional sensors (soil, plant, remote, machine, personnel)

Improve sensor data flow (including evaluation of alternative connectivity solutions)




Explore value of RGB indices



Ascertain value of crop, machine, & personnel data for improved decisions

Increase demonstrations